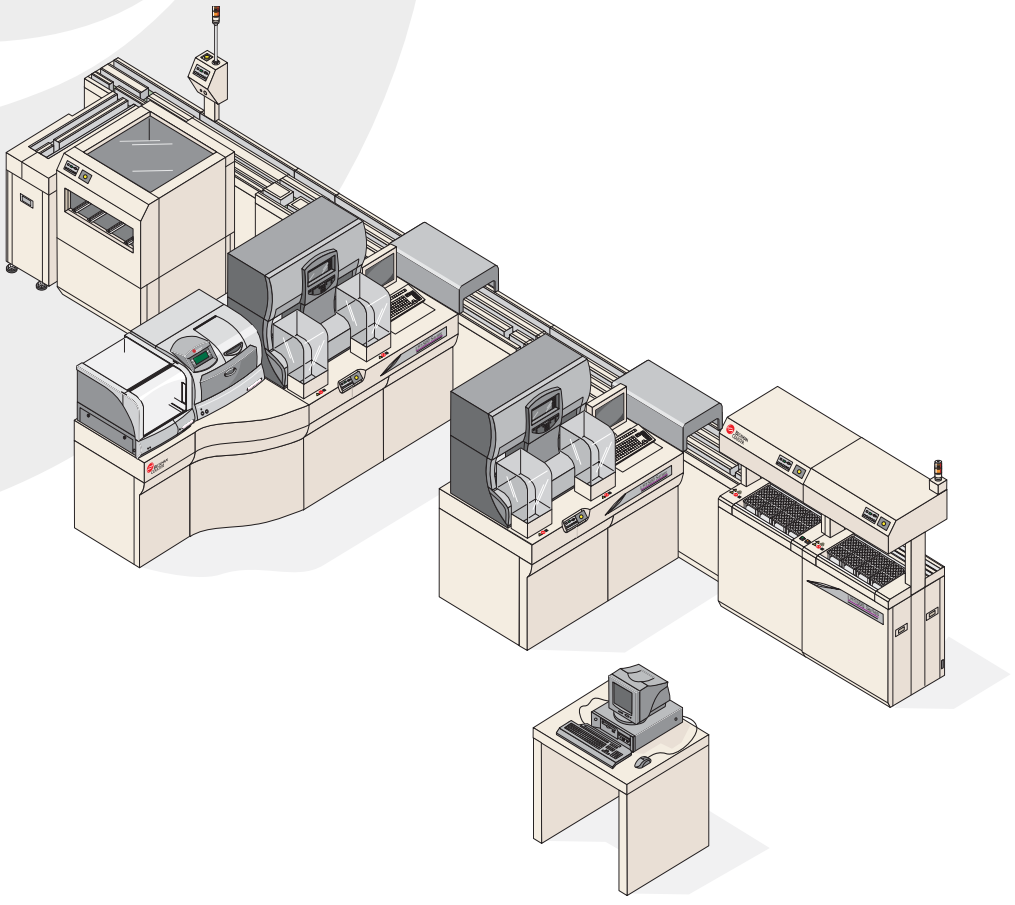
Error Recovery Guide

LH 1500® Hematology Automation System

Hematology Specimen Processing Module with System Manager



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BECKMAN COULTER®

LH 1500® Hematology Automation System
Error Recovery Guide
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Revision History

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This document applies to the latest software listed and higher versions. When a subsequent software version affects the information in this document, a new issue will be released.

Safety Notice

Read all product manuals and consult with Beckman Coulter-trained personnel before attempting to operate instrument. Do not attempt to perform any procedure before carefully reading all instructions. Always follow product labeling and manufacturer's recommendations. If in doubt as to how to proceed in any situation, contact your Beckman Coulter representative.

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Alerts for Warning and Caution

⚠ WARNING

WARNING indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury. May be used to indicate the possibility of erroneous data that could result in an incorrect diagnosis.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. May be used to indicate the possibility of erroneous data that could result in an incorrect diagnosis.

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Risk of operator injury if:

- **All doors covers and panels are not closed and secured in place prior to and during instrument operation.**
- **The integrity of safety interlocks and sensors is compromised.**
- **Instrument alarms and error messages are not acknowledged and acted upon.**
- **You contact moving parts.**
- **You mishandle broken parts.**
- **Doors, covers and panels are not opened, closed, removed and/or replaced with care.**
- **Improper tools are used for troubleshooting.**

To avoid injury:

- **Keep doors, covers and panels closed and secured in place while the instrument is in use.**
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- **Acknowledge and act upon instrument alarms and error messages.**
- **Keep away from moving parts.**
- **Report any broken parts to your Beckman Coulter Representative.**
- **Open/remove and close/replace doors, covers and panels with care.**
- **Use the proper tools when troubleshooting.**

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CHAPTER 1

Error Recovery Procedures

General Error Recovery

When a problem occurs at a unit, an audible alarm sounds and flashing warning lights activate. The keypad display at the affected unit will show which error code the problem generated. The error code is a three-digit number, which the keypad display shows in two segments (for example, "1-50"). The error code and sensor in question will also be displayed in red on the bottom left hand corner of the Line Controller until the alarm is silenced. The unit generating the error code will also be highlighted in red on the Line Controller until error is cleared.

1. Press the **ALARM** button on the keypad of the affected unit to silence the alarm.

2. Read the first one-digit segment of the error code on the keypad display on the affected unit.

3. Press the **FUNCTION (-)** button on the keypad to view the second two-digit segment of the error code on the keypad display. The combination of the first one-digit segment and second two-digit segment gives the complete three-digit error code used for troubleshooting the problem.

4. Refer to the Error Code tables for the appropriate Unit Error Code. For example, if the error occurs at the Outlet Unit, refer to Table 2.1, Outlet Unit Error Codes.

5. Look up the error code in the **Keypad Display** column of the error code table.

6. Read the information in the **Sensor**, **Problem**, and **Solution** columns for that error code. Do not yet attempt to perform the steps suggested in the **Solution** column.

7. Locate the sensor on the appropriate Unit Sensor Diagram by using the Grid Ref (Grid Reference). On the edges of the sensor diagram highlighted in Yellow is the locating reference grid. Follow the appropriate letter and number to the intersecting area on the sensor diagram. The sensor in error is located in the intersecting area.

8 Locate the actual sensor in error on the unit. The sensor in error is labeled on the unit.

9 Spend a moment looking at the hardware and try to find the cause of the problem.

10 After investigating the cause of the error, now perform the steps suggested in the Solution column.

11 Press **PAUSE**/**RUN** to resume routine operations. Pay attention to the area around the sensor that generated the error. Ensure that the error has been resolved.

12 If the problem persists, repeat the procedure.

13 Call your Beckman Coulter Representative for any unrecoverable errors.

Error Code Tables

The Error Code tables describe error messages generated by the LH 1500 Hematology Automation System. The tables provide the system error codes, the related sensor, a location reference point on the appropriate schematic diagram and a brief explanation of the possible problem and possible solutions.

1. **Keypad Display**: Contains the codes displayed on the keypads located at each unit of the system.
2. **Sensor**: Contains the alphanumeric codes as they appear in the Line Controller's Error Log. These codes, (for example, "SN50") refer to specific sensors.
3. **Problem**: Provides a description of the cause of the error.
4. **Sensor Diagram**: Provides the name and location of the appropriate schematic diagram.
5. **Grid Ref (Reference)**: Contains the reference position of the sensor on the appropriate schematic diagram.
6. **Solution**: Provides a way to resolve an error condition.

Sensor Codes

The sensor codes provide definitions of the alpha portion of the codes found in the **Sensor** column of the Error Code tables and Sensor diagrams.

1. AM = AC synchronous motor
2. AS = Magnetic autoswitch

3. BR = Bar-code reader
4. BZ = Audible alarm
5. DM = DC motor
6. LP = Lamp (keypad & warning light)
7. LS = Mechanical limit switch
8. PM = Pulse motor
9. SL = Pneumatic solenoid
10. SM = Stepper motor
11. SN = Sensor
12. SW = Keypad switch

Unit Error Code Categories

An Error Code is a three-digit number. The keypad on the unit in error first shows the one-digit segment. The first one-digit segment represents the error category.

1. Press the **FUNCTION (-)** button on the keypad to show the second two-digit segment. The second two-digit segment refers to a specific numbered component.

   Example: If the Error Code is 1-47 on a Connection Unit, it represents Sensor number 47 (SN47). This Error Code means that the sensor associated with the right safety cover over the Loading Arm detected a problem.
2. Press the **FUNCTION (+)** and **FUNCTION (-)** button alternately to toggle back and forth to see both sets of digit segments.

Table 1.1 Error Codes

Category	Problem	Error Description	Solution
0-xx	Bar-code	Bar-Code Error (BUZZxx)	1. Ensure bar-code is properly positioned on sample tube in relation to sample tube carrier. 2. Ensure bar-code is readable. 3. Ensure the bar-code spinners are properly working.
1-xx	Sensor	Sensor Error (SNxx) (Can also refer to ASxx)	Check the sensor position and look for possible obstruction.
2-xx	Pneumatic Solenoid	Pneumatic Solenoid Error (BUZZxx)	Check the pneumatic solenoid and look for possible obstruction.
3-xx	Bar-Code Reader	Bar-Code reader Error (BRxx)	Check that the bar-code reader light comes on and that the carrier rotates properly.

Table 1.1 Error Codes *(Continued)*

Category	Problem	Error Description	Solution
4-xx	Pulse Motor/AC Motor	Pulse Motor/AC Motor Error (PMxx, SMxx or DMxx)	Check the motor and/or belt drive.
5-xx	LH 750 Analyzer to Connection Unit Communication	Communication Error (LHxx)	Ensure that the Analyzer is Ready or the cassette is loading or unloading properly.
7-xx	Auto Sensor	Auto Sensor Error (ASxx)	Ensure that the pneumatic solenoid is working properly.
9-xx	Loading or Unloading Arm AC Motor	AC motor on Loading or Unloading Arm Error (AMxx)	Check the Loading or Unloading Arm motor.

Error Recovery Shutdown

The Error Recovery Shutdown procedure takes the LH 1500 system offline, stopping the command of the Line Controller, interrupting LIS interfacing and powering off the automation line.

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1 If possible, allow all specimens to complete analysis and arrive at appropriate positions on the Outlet and Stockyard.

---

2 If possible, press **PAUSE/RUN** button on the Outlet Unit keypad. Verify all sample tube carriers (pucks) stop behind the Outlet Unit and there are no moving sample tube carriers on the track.

---

3 Ensure all sample tubes are removed from the tracks and Connection Units.

NOTE Once a specimen is scanned at the bar-code reader inside the Connection Unit, the Line Controller assumes analysis is complete.

- During Error Recovery there may be unanalyzed specimens in a Connection Unit or on a LH 750. Unanalyzed specimens must be analyzed by Secondary Analysis Mode or STAT-CASS Mode after Error Recovery. If not, the unanalyzed specimens will route to the Stockyard or Outlet if placed back on the LH 1500 System without being analyzed by the LH 750.
- During Error Recovery specimens that have been analyzed by the LH 750, but not routed out of the Connection Unit, can be placed back on the LH 1500 System and will be properly routed to the Stockyard or Outlet.

---

4 At the Line Controller Main Menu screen Menu Bar, select **System Operation** > **Shutdown**. The Shutdown screen appears. If Shutdown is desired, select **<OK>.** To cancel Shutdown, select **<Cancel>**, then Select **<OK>**.

---

5 The Shutdown Reminder screen appears. If Shutdown is desired, select **<OK>**. To cancel Shutdown, select **<Cancel>**, then Select **<OK>**.

---

6 Ensure that the System Status box is Ready.

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7 Ensure that the Host Communication box is Offline.

NOTE While the Host Communication box is Offline, the LIS interfacing will be interrupted. LIS operations will be compromised. Do not allow the Host Communications to be Offline for extended periods. Perform System Startup to reset Host Communication to Online and restore LIS interfacing.

---

8 The Shutdown in Progress screen appears briefly on the Main Menu screen.

9 Press the red power **OFF** button on the Inlet Unit and turn off the automation line.

NOTE Wait 60 seconds before pressing the green power **ON** button.

Error Recovery Startup

The Error Recovery Startup procedure brings the LH 1500 system online; powering on the automation line, re-initializing robotics, restoring LIS interfacing and command to the Line Controller.

1 Complete System Shutdown Procedure.

2 Ensure the LH 755 Analyzers are powered up including: LH 750 Analyzers, Workstations, Slide Makers and Slide Stainers, if applicable.

3 On the LH Unit Blocks and Tracks remove any tubes and/or foreign objects.

4 Ensure the yellow emergency **Stop** buttons are in the "Out" position (not pushed) on all LH 1500 system components.

5 Press the green power **ON** button on the Inlet Unit to power on the automation line.

6 Select **System Operation > Startup** on the Main Menu Screen Menu Bar. The Startup screen displays and shows the options available for managing sample data while performing Startup on the LH 1500 System.

7 The following options are available:

- Delete Processed Samples Only - (default selection) This function looks at all processed samples, and unprocessed samples more than 72 hours old, and deletes them (includes exchanged racks). This deletion does not affect the stockyard or UDR racks, although samples in the Error rack and Pending rack will be deleted.
- Do Not Delete - saves all of the data currently in the Line Controller.
- Delete All Sample Data - deletes all data currently in the Line Controller. Select **<Do Not Delete>**

8 Select **<OK>** in the Startup screen to have the robotics initializes.

9 Check for any Units that are Magenta colored. This means that there is a communication error between the Line Controller and the LH 1500 System. It may be necessary to:

- Perform the Shutdown procedure. Select **Exit** on the Main Menu Screen Menu Bar at the Line Controller and ensure the Line Controller computer powers off. Press the red power **OFF** button at the Inlet Unit to power off the automation line and wait one minute. First. power on the automation line by pressing the green power **ON** button at the Inlet Unit. Second, turn the Line Controller computer on, then perform the Startup procedure.
- Follow the LIS Guidelines to troubleshoot the communication error.

10 Ensure that the System Status box is Active.

11 Ensure that the Host Communication box is Online.

NOTE If Host Communication box is Offline, follow the LIS Guidelines to re-establish communication.

12 Ensure that the Connection units have four cassettes loaded properly.

13 Ensure all LH 1500 system components are running (not paused) and all LH Unit blocks are properly Enabled (Auto Mode).

14 Continue with normal operation.

Disabling the LH Unit Block(s) from the Line Controller

The term LH Unit Block is defined as: The grouping of instrumentation consisting of a Connection Unit and a LH 750 or LH 755 run by the Line Controller computer. Disabling and Enabling LH Unit Blocks from the Line Controller is a workflow control tool during Routine Tasks or Extended Error Recovery. Disabling an entire LH Unit Block does not allow routing of any new specimens to the disabled Unit Block(s). The Line Controller then routes all new specimens to the enabled LH Unit Block(s). Specimens remaining on the disabled LH Unit Block will be analyzed, off-loaded from the Connection Unit and routed to their destination.

1 At the Line Controller Main Menu, select the **<Setup>** button from the appropriate LH Unit Block to be disabled.

2 At the LH Analyzer Setup Screen Connection Area, select **<Enable>** to enable LH Unit Block. To disable Unit LH Block select **<Disable>**.

3 Select **<OK>** to save changes or Select **<Cancel>** to exit.

4 Select **<OK>** and return to the Main Menu. Enabled LH Unit Blocks appear off-white. Disabled Unit blocks appear gray.

5 Perform the Routine Tasks or Error Recovery procedure.

NOTE

- After a Connection Unit is Disabled, the Loading and Unloading Arms pause once all specimens have been off-loaded from the LH 750 Analyzer. The Loading and Unloading Arm Covers can then be removed.
- While a Connection Unit is Disabled, that Connection Unit must be in STAT-CASS Mode to load cassettes from the right side loading bay.
- If all Connection Units are disabled, all new specimens and unanalyzed specimens on the LH 1500 System must be analyzed by Secondary Analysis Mode or STAT-CASS Mode.

6 To re-enable the appropriate LH Unit Block perform Steps 1-3, but Select **<Enable>** at Step 2.

Removing Cassettes from the Connection Unit

Proper removal of the cassettes in a Connection Unit minimizes system errors.

1 Remove the right-side tabletop access cover of the Connection Unit and set aside. The Connection Unit will PAUSE.

2 Remove cassette from position number one. Refer to Figure 1.1, Cassette Handling Mechanism.

NOTE When recovering from a cassette jam, it may not be possible to remove cassettes at position number one due to excessive Errors and/or Alarms. If so, proceed to Step 7.

3 Replace the right-side tabletop access cover; ensure sensor trigger in the far left corner is properly positioned.

4 Press the **PAUSE**/**RUN** button on Connection Unit. Allow the next cassette to advance to position number one.

5 Repeat steps 1 through 4 until third cassette is ready to be removed.

6 Remove third cassette at position number one. At the same time remove the fourth (last) cassette at position number six. Proceed to Step 9.

7 Remove the right-side tabletop access cover and remove the front covers of the Connection Unit, and set aside.

8 Remove all four of the cassettes from the Connection Unit.

NOTE Once a specimen is scanned by the bar-code reader inside the Connection Unit, the Line Controller assumes analysis is complete.

- During Error Recovery there may be unanalyzed specimens in a Connection Unit or on a LH 750. Unanalyzed specimens must be analyzed by Secondary Analysis Mode or STAT-CASS Mode. If not, the unanalyzed specimens will go to the Stockyard or Outlet if placed back on the LH 1500 System.

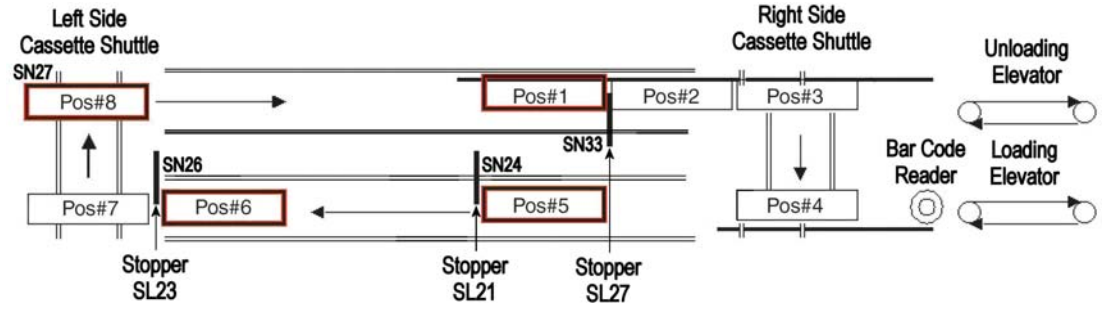
- During Error Recovery specimens that have been analyzed by the LH 750, but not routed out of the Connection Unit, can be placed back on the LH 1500 System, and will be properly routed to the Stockyard or Outlet.

9 Replace the front covers back into their proper positions and/or the right-side tabletop access cover.

10 Press the **PAUSE/RUN** button on Connection Unit. Ensure there are no errors displayed on the keypad.

NOTE If errors persist due to a cassette jam, see Loading Cassettes in the Connection Unit. Multiple Errors and Alarms may occur. Continue to **PAUSE/RUN** and/or load cassettes until errors are cleared.

Figure 1.1 Cassette Handling Mechanism



Loading Cassettes in the Connection Unit

Proper loading of the cassettes minimizes system errors and allows the Connection Unit to accurately organize the cassettes.

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1 Before loading cassettes into a LH Connection Unit, ensure that the:

- LH 1500 robotic line has initialized with no errors.
- LH connection keypad LED indicates the AUTO status.
- LH connection Unit has not detected an error (if possible).

---

2 Remove the right-side tabletop access cover of the Connection Unit and set aside. The Connection Unit will Pause.

---

3 Load the first cassette at position #5 (the label must face away from operator). Refer to Figure 1.2, LH Cassette Handling Mechanism.

---

4 Replace the right-side tabletop access cover back into the proper safety position; make sure the sensor in the upper left corner is properly positioned.

---

5 Press the **PAUSE/RUN** button on Connection Unit. Allow the cassette to advance to position number six.

---

6 Repeat steps 2 through 5 swiftly until fourth (last) cassette is loaded onto Connection Unit. Timing is crucial. Do not exceed the maximum number of four cassettes.

NOTE

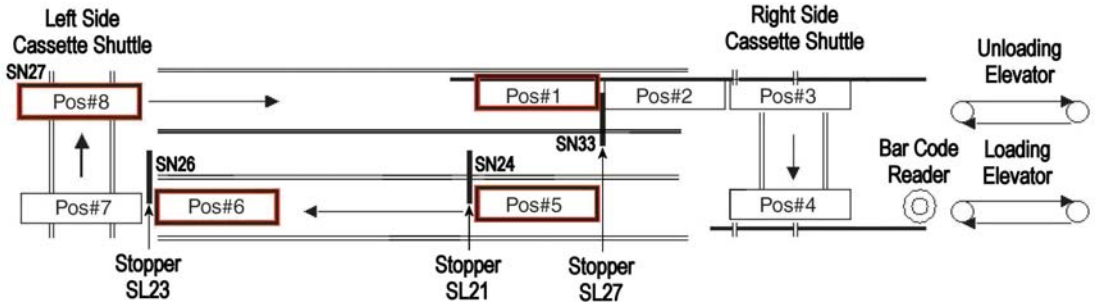
- Do not place more than one cassette at a time on the Connection Unit.
- Do not insert next cassette if another cassette is in position number four, wait until cassette advances to position number six.

---

7 Ensure the cassettes have fully cycled and no errors are displayed on the keypad.

NOTE Home cassette positions are indicated by red outlined areas (Position number one, Position number five, Position number six and Position number eight).

Figure 1.2 LH Cassette Handling Mechanism



Secondary Analysis Mode on the LH 1500 System

The use of Secondary Mode allows analysis of specimens without track processing. Secondary Mode is the quickest mode of analysis for STAT specimens when numerous specimens are being processed by the LH 1500 System.

1 Press **STOP** one time ONLY on the LH 750 Analyzer's keypad.

2 When "READY" appears on the LH 750 Analyzer use the bar-code wand and scan the sample ID in the Bar-code field into the LH 750 Workstation Command Center, or input the sample ID into the LH 750 Analyzer numeric keypad.

3 Aspirate the sample using the secondary aspiration probe.

4 Repeat steps 2 - 3 until all samples are analyzed.

NOTE If numerous samples are to be analyzed in Secondary Mode, proceed to DISABELING THE LH 1500 CONNECTION UNIT Procedure. Disabling the Connection Unit will allow the workload to be diverted to the other instrument. Processing samples while PAUSED will back-up the workload during Secondary Analysis.

5 After the cycle completes and results are received at the LH 750 Workstation ("READY" appears on the LH 750 Analyzer), press **START/CONT** on the LH 750 Analyzer's keypad to continue automatic mode processing.

STAT-CASS Mode

The STAT-CASS mode (manual cassette mode) of operation allows processing of cassettes without automation loading and unloading.

1. Press the **STAT-CASS** button one time only to select the STAT-CASS mode of operation. The LH Connection Unit stops cassette loading from the Connection Unit Loading Arm to the LH Analyzer. (Samples currently being processed on the LH 750 Analyzer complete analysis and return to the Connection Unit for unloading.)

2. Wait until the STAT-CASS LED stops flashing and is continuously lit before loading the manual cassette.

3. Remove the Loading and Unloading Arm covers at the LH Connection Unit.

4. Place the manual cassettes into the LH 750 Analyzer's right-side loading bay.

5. After analysis completes ("READY" appears on the LH 750 Analyzer), remove the finished cassettes from the left-side unloading bay.

   NOTE Ensure that the manual cassettes are removed from the LH 750 Analyzer before replacing the Loading and Unloading Arm covers.

6. Replace the Loading and Unloading Arm covers.

7. Press **STAT-CASS** to end the STAT-CASS mode of operation and return the LH Connection Unit to normal AUTO mode.

   NOTE During the STAT-CASS mode of operation, the LH Connection Unit continues to load samples into cassettes. Samples inside the Connection Unit are held for later processing. However, 15 minutes of operation in the STAT-CASS mode generates a time-out error for samples held in the Connection Unit. The Unit will continue to alarm audibly without an error code until the manual cassettes are removed, the covers replaced and the STAT-CASS mode is deselected.

Bypassing the Connection Unit Table

In the event of an unrecoverable error condition due to hardware errors at the Connection Unit Table, the Connection Unit will PAUSE and prevent samples from being processed. Utilizing Function 97 will bypass the Connection Unit Table allowing processing of samples by the Connection Unit Conveyor bar-code reader.

1. Perform the Error Recovery Shutdown procedure of the LH 1500 System.

2. Perform the Error Recovery Startup procedure of the LH 1500 System.

3. Ensure that the Connection Unit is in MANUAL MODE (the green LED pointing to MANUAL is ON) and the keypad displays the numbers **00**.

   If not, press and hold down the AUTO/MANUAL key for 10 seconds until the green LED next to MANUAL is ON.

4. Press the **FUNCTION (-)** key to advance the display to number **97**.

5. Press the **ENTER** key.

6. Ensure that the sample tube bar-code labels are successfully being read at the Conveyor Unit Conveyor bar-code reader (BR02) by observing that the green LED on back of the bar-code reader turns ON when it reads the sample tube label.

CHAPTER 2

Outlet Unit Error Recovery Codes

Outlet Unit Error Recovery Codes

The Outlet Unit Error Code Table 2.1 describes error messages generated by the LH 1500 Hematology Automation System. The table provides the system error codes, the related sensor, a location reference point on the schematic diagram and a brief explanation of the possible problem and possible solutions.

Table 2.1 Outlet Unit Error Codes

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
0-00	BZ00	Bar-code label did not read or was incorrectly positioned on tube.	Outlet Unit	B-3	**1.** Ensure the bar-code is present and properly positioned. **2.** Turn the sample tube in the carrier at BR01 with bar-code facing the bar-code reader. **3.** Press **PAUSE**/**RUN** to clear the error.
0-01	BZ01	Bar-code label did not read or was incorrectly positioned on tube.	Outlet Unit	B-3	**1.** Ensure the bar-code is present and properly positioned. **2.** Turn the sample tube in the carrier at BR01 with bar-code facing the bar-code reader. **3.** Press **PAUSE**/**RUN** to clear the error.
1-01	SN01	Outlet Transfer Arm error finding the X-axis home position.	Outlet Unit	D-3	**1.** Ensure there are no obstructions in the path of the Outlet Transfer Arm. **2.** Press **PAUSE**/**RUN** to clear the error. If the problem persists, call your Beckman Coulter Representative.
1-02	SN02	Outlet Transfer Arm error finding the X-axis home position.	Outlet Unit	D-3	**1.** Ensure there are no obstructions in the path of the Outlet Transfer Arm. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
1-05	SN05	Outlet rack #1 from the left not positioned correctly.	Outlet Unit	D-3	**1.** Ensure that Outlet rack #1 is in place and correctly seated. **2.** Press **PAUSE**/**RUN** to clear the error.

Table 2.1 Outlet Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
1-06	SN06	Outlet rack #2 from the left not positioned correctly.	Outlet Unit	D-4/5	**1.** Ensure that Outlet rack #2 is in place and correctly seated. **2.** Press **PAUSE**/**RUN** to clear the error.
1-07	SN07	Outlet rack #3 from the left not positioned correctly.	Outlet Unit	D-5	**1.** Ensure that Outlet rack #3 is in place and correctly seated. **2.** Press **PAUSE**/**RUN** to clear the error.
1-08	SN08	Outlet rack #4 from the left not positioned correctly.	Outlet Unit	D-5	**1.** Ensure that Outlet rack #4 is in place and correctly seated. **2.** Press **PAUSE**/**RUN** to clear the error.
1-09	SN09	Sample tube carrier error at Outlet bar-code reader.	Outlet Unit	C-3	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
1-10	SN10	Fiber optic sensor did not detect a sample tube at Outlet bar-code reader BR01.	Outlet Unit	C-3	**1.** Locate missing tube and place into the waiting carrier. **2.** Press **PAUSE**/**RUN** to clear the error.
1-11	SN11	Proximity sensor did not detect a sample tube carrier released from the Outlet bar-code reader.	Outlet Unit	B2	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
1-12	SN12	Sample tube carrier proximity sensor error before the Outlet bar-code reader.	Outlet Unit	C-4	This error occurs during Power On, if the sensor is defective. **1.** Press **PAUSE**/**RUN** to clear the error.
1-13	SN13	Sample tube carrier proximity sensor error at the Outlet waiting queue.	Outlet Unit	C-4	This error occurs during Power On, if the sensor is defective. **1.** Press **PAUSE**/**RUN** to clear the error.
1-16	SN16	Sample tube carrier error at the Outlet return track.	Outlet Unit	B-5	This error occurs during Power On, if the sensor is defective. **1.** Press **PAUSE**/**RUN** to clear the error.
1-18	SN18	Proximity sensor did not detect a sample tube carrier from the return track.	Outlet Unit	C-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.

Table 2.1 Outlet Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
1-19	SN19	Proximity sensor did not detect a sample tube carrier entering the Outlet waiting queue.	Outlet Unit	C-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
1-20	SN20	Outlet Transfer Arm error finding the Y-axis home position.	Outlet Unit	C-5	**1.** Ensure the Outlet Transfer Arm movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
1-21	SN21	Outlet Transfer Arm error finding the Y-axis home position.	Outlet Unit	C-5	**1.** Ensure the Outlet Transfer Arm movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
2-01	SL01	Outlet Transfer Arm Z-axis cylinder SL01 did not fully extend / retract and misses activating the limit sensor.	Outlet Unit	Transfer Arm	**1.** Clear any obstruction. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
2-03	SL03	Stopper error at the Outlet sample tube carrier loading/ unloading position.	Outlet Unit	B-3 b	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-04	SL04	Stopper error at the Outlet sample tube carrier loading/ unloading position.	Outlet Unit	B-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-05	SL05	Stopper error before the Outlet sample tube carrier loading/ unloading position.	Outlet Unit	B-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-06	SL06	Stopper error at Outlet waiting queue lane	Outlet Unit	C-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.

Table 2.1 Outlet Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
2-07	SL07	Stopper error at Outlet waiting queue lane.	Outlet Unit	C-3/4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-08	SL08	Outlet Divider Arm error at the exit of the waiting queue. Associated with AS08 (retracted) and AS09 (extended).	Outlet Unit	C-3	**1.** Ensure the gate arm is free to extend and retract. **2.** Verify the Divider arm is not slow to open and close. If so, the cylinder air flow controller may need adjustment. **3.** Press **PAUSE**/**RUN** to clear the error.
2-09	SL08 #2	Outlet Divider Arm error at the main lane. Associated with AS15 (retracted) and AS16 (extended).	Outlet Unit	B-3	**1.** Ensure the gate arm is free to extend and retract. **2.** Verify the Divider arm is not slow to open and close. If so, the cylinder air flow controller may need adjustment. **3.** Press **PAUSE**/**RUN** to clear the error.
2-10	SL10	Stopper error at Outlet return lane.	Outlet Unit	B-5	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-11	SL11	Stopper error at Outlet return lane.	Outlet Unit	B-5	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-12	SL12	Outlet Divider Arm error at the beginning of main lane. Associated with AS12 (retracted) and AS13 (extended).	Outlet Unit	B-5	**1.** Ensure the gate arm is free to extend and retract. **2.** Verify the Divider arm is not slow to open and close. If so, the cylinder air flow controller may need adjustment. **3.** Press **PAUSE**/**RUN** to clear the error.
2-13	SL13	Stopper error before the Outlet bar-code reader.	Outlet Unit	B/C-3 a	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.

Table 2.1 Outlet Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
3-01	BR01	Failure of the bar-code reader BR01 to read. May have lost its programming.	Outlet Unit	B-3	**1.** Perform **SHUTDOWN** at Line Controller. **2.** Enter the **System Setup** > **Maintenance** menu. Default Password=password1 **3.** Verify correct setting of bar-code label and exit screen. Upon exiting the screen the bar-code readers will be reprogrammed. **4.** If the problem persists, call your Beckman Coulter Representative.
4-01	PM01	Failure to move the Outlet Transfer Arm in the X-axis direction.	Outlet Unit	E-2	**1.** Ensure the Outlet Transfer Arm movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If there is no obstruction: **a.** Power **OFF** Outlet Unit, wait one minute and then Power **ON** the Outlet Unit to reset. **4.** If the problem persists, call your Beckman Coulter Representative.
4-02	PM02	Failure to move the Outlet Transfer Arm in the Y-axis direction.	Outlet Unit	B-15	**1.** Ensure the Outlet Transfer Arm movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If there is no obstruction: **a.** Power **OFF** Outlet Unit, wait one minute and then Power **ON** the Outlet Unit to reset. **4.** If the problem persists, call your Beckman Coulter Representative.

a. See Abbreviations for a list of sensor codes.

CHAPTER 3

Outlet Unit

Outlet Unit Pictures

This chapter contains pictures of the Outlet Unit, Outlet Unit Transfer Arm, Outlet Unit Conveyor and the associated diagrams.

Figure 3.1 Outlet Unit

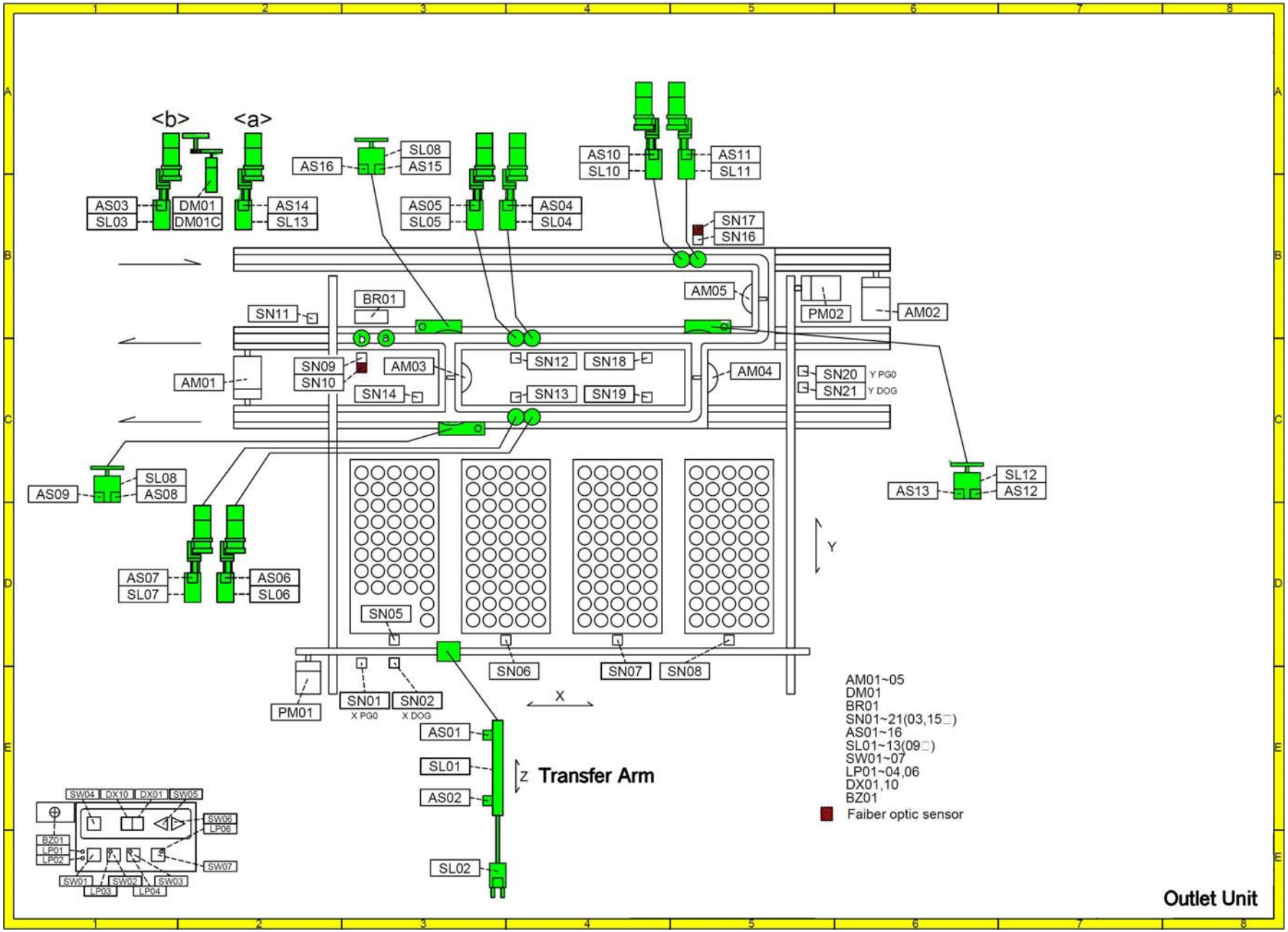
Figure 3.2 Outlet Unit Transfer Arm

Figure 3.3 Outlet Unit Conveyor

Figure3.4 Outlet Unit Sensor Cods

LH 1500 HEMATOLOGY AUTOMATION SYSTEM

Outlet Unit



Sensor Codes

The sensor codes provide definitions of the alpha portion of the codes found in the **Sensor** column of the Error Code tables and Sensor diagrams.

1. AM = AC synchronous motor
2. AS = Magnetic autoswitch
3. BR = Bar-code reader
4. BZ = Audible alarm
5. DM = DC motor
6. LP = Lamp (keypad & warning light)
7. LS = Mechanical limit switch
8. PM = Pulse motor
9. SL = Pneumatic solenoid
10. SM = Stepper motor
11. SN = Sensor
12. SW = Keypad switch

CHAPTER 4

Inlet Unit Error Recovery

Inlet Unit Error Recovery Codes

The Inlet Unit Error Code Table 4.1 describes error messages generated by the LH 1500 Hematology Automation System. The table provides the system error codes, the related sensor, a location reference point on the schematic diagram and a brief explanation of the possible problem and possible solutions.

Table 4.1 Inlet Unit Error Codes

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
1-01	SN01	Inlet Transfer Arm error finding the X-axis home position.	Inlet Unit	D-3	**1.** Ensure there are no obstructions in the path of the Inlet Transfer Arm. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
1-02	SN02	Inlet Transfer Arm error finding the X-axis near home position.	Inlet Unit	D-3	**1.** Ensure there are no obstructions in the path of the Inlet Transfer Arm. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
1-05	SN05	Inlet rack #1 from the left not positioned correctly.	Inlet Unit	D-3	**1.** Ensure that Inlet rack #1 is in place and correctly seated. **2.** Press **PAUSE**/**RUN** to clear the error.
1-06	SN06	Inlet rack #2 from the left not positioned correctly.	Inlet Unit	D-3	**1.** Ensure that Inlet rack #2 is in place and correctly seated. **2.** Press **PAUSE**/**RUN** to clear the error.
1-07	SN07	Inlet rack #3 from the left not positioned correctly.	Inlet Unit	D-4	**1.** Ensure that Inlet rack #3 is in place and correctly seated. **2.** Press **PAUSE**/**RUN** to clear the error.
1-08	SN08	Inlet rack #4 from the left not positioned correctly.	Inlet Unit	D-5	**1.** Ensure that Inlet rack #4 is in place and correctly seated. **2.** Press **PAUSE**/**RUN** to clear the error.

Table 4.1 Inlet Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
1-09	SN09	Sample tube carrier failed to arrive in the time allotted at the Inlet sample tube carrier loading position.	Inlet Unit	C-3	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
1-11	SN11	Proximity sensor did not detect a sample tube carrier released from the Inlet sample tube carrier loading position.	Inlet Unit	B-2	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
1-12	SN12	Sample tube carrier error before the Inlet sample tube carrier loading position.	Inlet Unit	C-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
1-13	SN13	Sample tube carrier error at the Inlet waiting queue.	Inlet Unit	C-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
1-20	SN20	Inlet Transfer Arm error finding the Y-axis home position.	Inlet Unit	C-5	**1.** Ensure the Inlet Transfer Arm movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
1-21	SN21	Inlet Transfer Arm error finding the Y-axis near home position.	Inlet Unit	C-5	**1.** Ensure the Inlet Transfer Arm movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
2-01	SL01	Inlet Transfer Arm Z-axis cylinder did not fully extend / retract and misses activating the limit sensor. The limit sensors are AS01 (up) and AS02.	Inlet Unit	Transfer Arm	**1.** Clear any obstruction. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
2-03	SL03	Stopper error at the Inlet sample tube carrier loading position.	Inlet Unit	B/C-3	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-04	SL04	Stopper error before the Inlet sample tube carrier loading position.	Inlet Unit	B/C-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.

Table 4.1 Inlet Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
2-05	SL05	Stopper error before the Inlet sample tube carrier loading position.	Inlet Unit	B/C-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-06	SL06	Stopper error at the Inlet waiting queue.	Inlet Unit	C-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-07	SL07	Stopper error at the Inlet waiting queue.	Inlet Unit	C-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-08	SL08	Inlet Divider Arm error at the exit of the waiting queue. Associated with AS15 (retracted) and AS16 (extended).	Inlet Unit	B-3	**1.** Ensure the gate is free to extend and retract. **2.** Verify the Divider Arm is not slow to extend and retract. **3.** If so, the airflow controller may need adjustment. **4.** Press **PAUSE**/**RUN** to clear the error.
4-01	PM01	Failure to move the Inlet Transfer Arm in the X-axis direction.	Inlet Unit	E-2	**1.** Ensure the Inlet Transfer Arm movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If there is no obstruction: **a.** Power **OFF** Inlet Unit, wait one minute and then Power **ON** the Inlet Unit to reset. **4.** If the problem persists, call your Beckman Coulter Representative.
4-02	PM02	Failure to move the Inlet Transfer Arm in the Y-axis direction.	Inlet Unit	B-5/6	**1.** Ensure the Inlet Transfer Arm movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If there is no obstruction: **a.** Power **OFF** Inlet Unit, wait one minute and then Power **ON** the Inlet Unit to reset. **4.** If the problem persists, call your Beckman Coulter Representative.

a. See Abbreviations for a list of sensor codes.

CHAPTER 5

Inlet Unit

Inlet Unit Pictures

This chapter contains pictures of the Inlet Unit, Inlet Unit Transfer Arm, Inlet Unit Conveyor and the associated diagram.

Figure 5.1 Inlet Unit

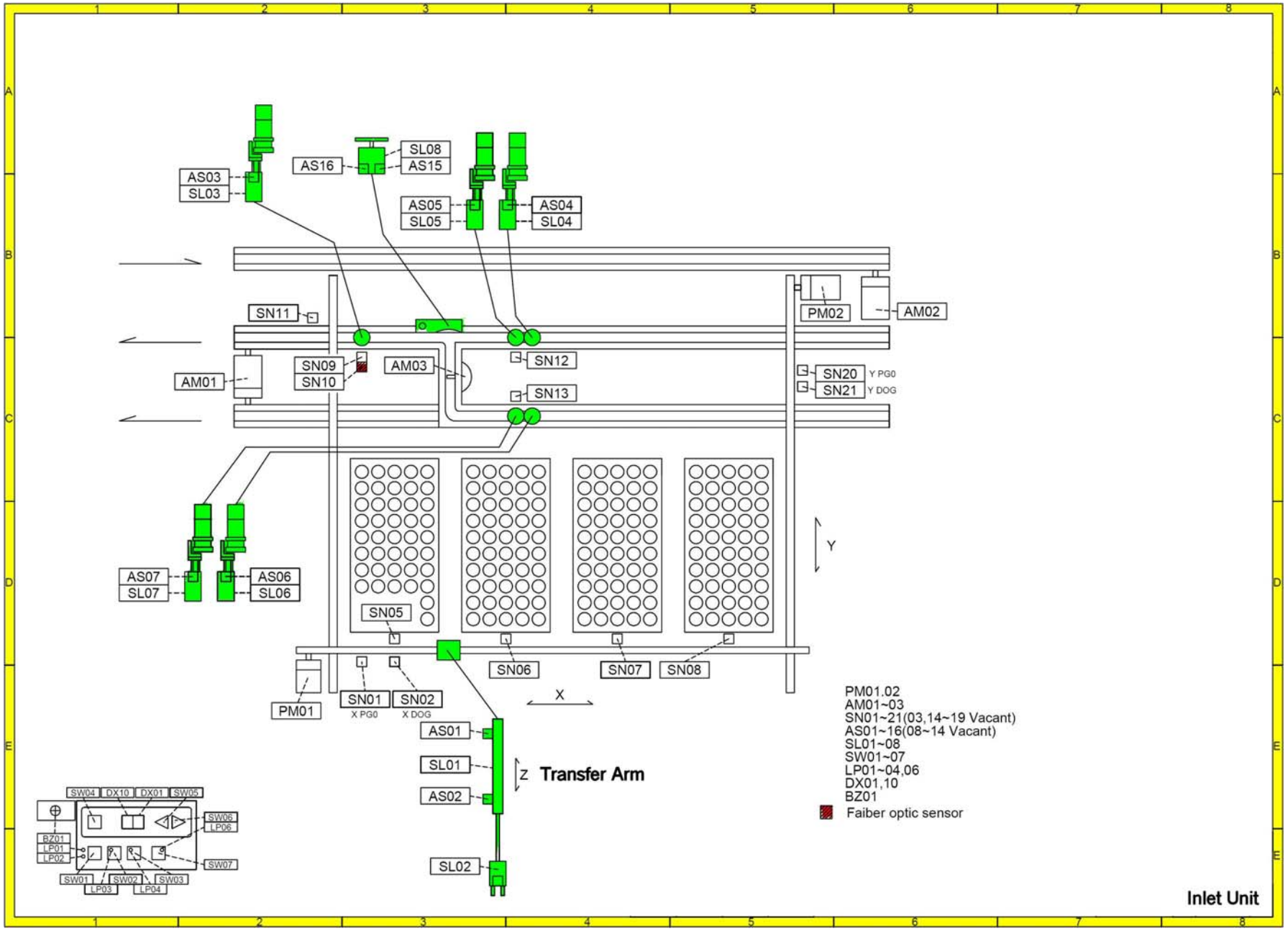
Figure 5.2 Inlet Unit Transfer Arm

Figure 5.3 Inlet Unit Conveyor

Figure 5.4 Inlet Unit Sensor Codes

LH 1500 HEMATOLOGY AUTOMATION SYSTEM

Inlet Unit



Sensor Codes

The sensor codes provide definitions of the alpha portion of the codes found in the **Sensor** column of the Error Code tables and Sensor diagrams.

1. AM = AC synchronous motor
2. AS = Magnetic autoswitch
3. BR = Bar-code reader
4. BZ = Audible alarm
5. DM = DC motor
6. LP = Lamp (keypad & warning light)
7. LS = Mechanical limit switch
8. PM = Pulse motor
9. SL = Pneumatic solenoid
10. SM = Stepper motor
11. SN = Sensor
12. SW = Keypad switch

CHAPTER 6

Connection Unit

Connection Unit Error Recovery

The Connection Unit Error Code Table 6.1 describes error messages generated by the LH 1500 Hematology Automation System. The table provides the system error codes, the related sensor, a location reference point on the schematic diagram and a brief explanation of the possible problem and possible solutions.

Table 6.1 Connection Unit Error Codes

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
1-01	SN01	Obstruction or hardware error at lower limit sensor on the Cassette Loading Arm.	Connection Unit Loading and Unloading Arms	D-5	**1.** Clear any obstruction. **2.** If there is no obstruction: **a.** **SHUTDOWN** at Line Controller and Power **OFF** automation line at Inlet Unit. **b.** Power **ON** the automation line at Inlet Unit. **c.** Perform **STARTUP** at Line Controller. **3.** If the problem persists, call your Beckman Coulter Representative.
1-02	SN02	Obstruction or hardware error at the middle limit sensor on the Cassette Loading Arm.	Connection Unit Loading and Unloading Arms	C-5	**1.** Clear any obstruction. **2.** If there is no obstruction: **a.** **SHUTDOWN** at Line Controller and Power **OFF** automation line at Inlet Unit. **b.** Power **ON** the automation line at Inlet Unit. **c.** Perform **STARTUP** at Line Controller. **3.** If the problem persists, call your Beckman Coulter Representative.

Table 6.1 Connection Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
1-03	SN03	Obstruction or hardware error at the upper limit sensor on the Cassette Loading Arm.	Connection Unit Loading and Unloading Arms	B-5	**1.** Clear any obstruction. **2.** If there is no obstruction: **a.** **SHUTDOWN** at Line Controller and Power **OFF** automation line at Inlet Unit. **b.** Power **ON** the automation line at Inlet Unit. **c.** Perform **STARTUP** at Line Controller. **3.** If the problem persists, call your Beckman Coulter Representative.
1-04	SN04	Obstruction or hardware error at the lower limit sensor on the Cassette Unloading Arm.	Connection Unit Loading and Unloading Arms	D-2	**1.** Clear any obstruction. **2.** If there is no obstruction: **a.** **SHUTDOWN** at Line Controller and Power **OFF** automation line at Inlet Unit. **b.** Power **ON** the automation line at Inlet Unit. **c.** Perform **Startup** at Line Controller. **3.** If the problem persists, call your Beckman Coulter Representative.
1-05	SN05	Obstruction or hardware error at the middle limit sensor on the Cassette Unloading Arm.	Connection Unit Loading and Unloading Arms	C-2	**1.** Clear any obstruction. **2.** If there is no obstruction: **a.** **SHUTDOWN** at Line Controller and Power **OFF** automation line at Inlet Unit. **b.** Power **ON** the automation line at Inlet Unit. **c.** Perform **STARTUP** at Line Controller. **3.** If the problem persists, call your Beckman Coulter Representative.
1-06	SN06	Obstruction or hardware error at the upper limit sensor on the Cassette Unloading Arm.	Connection Unit Loading and Unloading Arms	B-2	**1.** Clear any obstruction. **2.** If there is no obstruction: **a.** **SHUTDOWN** at Line Controller and Power **OFF** automation line at Inlet Unit. **b.** Power **ON** the automation line at Inlet Unit. **c.** Perform **STARTUP** at Line Controller. **3.** If the problem persists, call your Beckman Coulter Representative.
1-21	SN21	Sample Table Loading Arm at the home position did not initialize due to an obstruction or hardware failure.	Connection Unit Top View	D-7	**1.** Clear any obstruction. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.

Table 6.1 Connection Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
1-22	SN22	Sample Tube Loading Arm at the near home position did not initialize due to an obstruction or hardware failure.	Connection Unit Top View	D-7	**1.** Clear any obstruction. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
1-23	SN23	Sample Tube Loading Arm at the limit position did not initialize due to an obstruction or hardware failure.	Connection Unit Top View	D-6	**1.** Clear any obstruction. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
1-24	SN24	Scenarios: **1.** Leading edge of cassette is not detected in time at cassette load position #5 (cassette was trapped). **2.** Cassette is incorrectly detected at sensor 24 (due to cassette not loading onto Cassette Loading Arm, cassette was left on track).	Connection Unit Top View	D-4	**1.** Press **PAUSE**/**RUN** to clear the error. **2.** If the problem persists: **a.** Open the right-side tabletop safety cover. **b.** Ensure there is no obstruction (cassette trapped at shuttle position #5 or cassette did not load onto Loading Arm). **c.** Clear any obstruction if possible. **3.** If there is no obstruction and cassette is in position #5, **a.** Manually load cassette onto Loading Arm in proper finger position (cassette positions 1 and 5). **b.** Replace the right-side tabletop safety cover. **c.** Press P**AUSE**/**RUN** to clear the error. **4.** If unable to remove trapped cassette: **a.** Perform **SHUTDOWN** at Line Controller **b.** Power **OFF** the automation line at Inlet Unit. **c.** Cut off incoming lab air supply to the line. (If June-air compressor, turn Red Valve in back of Compressor Unit. **d.** Manually depress air cylinder (SL02) and then remove trapped cassette. **e.** Reconnect air supply. **f.** Power **ON** the automation line at Inlet Unit. **g.** Perform **STARTUP** at Line Controller. **5.** If the problem persists, call your Beckman Coulter Representative.

Table 6.1 Connection Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
1-25	SN25	Scenario: **1.** Unanalyzed cassette may be in cassette load position #5 of the shuttle and is blocking sensor SN25. **2.** There may be an obstruction blocking sensor SN25 before or after a cassette is loaded at position #5. Sensor SN25 should point to sample tube position #2 in the cassette	Connection Unit Top View	D-4	**1.** Press **PAUSE**/**RUN** to clear the error. **2.** If the problem persists: **a.** Open the left side bottom safety cover. **b.** Ensure there is no obstruction (cassette trapped at shuttle position #5 or cassette did not load onto Loading Arm). **c.** Clear any obstruction if possible. **d.** Replace covers and press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
1-26	SN26	Cassette in shuttle has not moved from cassette position #5 to position #6.	Connection Unit Top View	D-2	**1.** Press **PAUSE**/**RUN** to clear the error. **2.** If the problem persists: **a.** Open the left side bottom safety cover. **b.** Ensure there is no obstruction (cassette trapped at shuttle position #5 or cassette did not load onto Loading Arm). **c.** Clear any obstruction if possible. **d.** Move cassette to position #6 in the shuttle. **e.** Replace cover and press **PAUSE**/**RUN** to clear the error **3.** If the problem persists, call your Beckman Coulter Representative.
1-27	SN27	Sensor SN27 of the Unload Shuttle is not blocked by the unloading cassette as expected. (Cassette not properly picked up from Analyzer's left side unloading bay and placed at Unload Shuttle cassette position #7.)	Connection Unit Top View	C-1/ D-1	**1.** Remove Unloading Arm Cover from the left-side of Connection Unit. **2.** Block SN27 with yardstick so that the sensor light turns Green. **3.** While blocking, the sensor light is Green. **4.** Press **PAUSE**/**RUN** to clear the error. **5.** If followed by Error Code 1-33: **a.** Place proper cassette inside Connection Unit at position #1. **b.** Press **PAUSE**/**RUN** to clear the error.

Table 6.1 Connection Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
1-28	SN28	One of two limit sensors associated with cylinder SL25. Unload Cassette Shuttle at position #8.	Connection Unit Top View	C-1	This error occurs during Power **ON**, if the sensor is defective. **1.** Press **PAUSE**/**RUN** to clear the error. **2.** If the problem persists, call your Beckman Coulter Representative.
1-29	SN29	One of two limit sensors associated with cylinder SL25. Unload Cassette Shuttle at position #7.	Connection Unit Top View	D-1	This error occurs during Power **ON**, if the sensor is defective. **1.** Press **PAUSE**/**RUN** to clear the error. **2.** If the problem persists, call your Beckman Coulter Representative.
1-30	SN30	One of two limit sensors associated with cylinder SL26 at position #8 at the Left Side Unload Cassette Shuttle.	Connection Unit Top View	C-2	This error occurs during Power **ON**, if the sensor is defective. **1.** Press **PAUSE**/**RUN** to clear the error. **2.** If the problem persists, call your Beckman Coulter Representative.
1-31	SN31	One of two limit sensors associated with cylinder SL26 at position #8 at the Left Side Unload Cassette Shuttle.	Connection Unit Top View	C-1	This error occurs during Power **ON**, if the sensor is defective. **1.** Press **PAUSE**/**RUN** to clear the error. **2.** If the problem persists, call your Beckman Coulter Representative.
1-32	SN32	Analyzed cassette is in cassette position #1. SN32 should point to sample tube position #2 in the cassette.	Connection Unit Top View	C-4	This error occurs during Power **ON**, if the sensor is defective. **1.** Press **PAUSE**/**RUN** to clear the error. **2.** If the problem persists, call your Beckman Coulter Representative.

Table 6.1 Connection Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
1-33	SN33	Scenario: **1.** Leading edge of cassette was not detected by sensor SN33 at cassette position #1. **2.** Cassette trapped by Stopper cylinder SL27 at cassette position #1.	Connection Unit Top View	C-5	**1.** Press **PAUSE**/**RUN** to clear the error. **2.** If the problem persists: **a.** Open the right-side tabletop safety cover. **b.** Ensure there is no obstruction in path of cassette. (1). **c.** Clear any obstruction if possible. **d.** Replace the right-side tabletop safety cover. **e.** Press **PAUSE**/**RUN** to clear the error. **3.** If unable to remove trapped cassette: (2) **a.** Perform **SHUTDOWN** at Line Controller. **b.** Power **OFF** automation line at Inlet Unit. **c.** Cut off incoming lab air supply to the line. (If June-air compressor, turn Red Valve in back of Compressor Unit.) **d.** Manually depress air cylinder (SL27) and then remove trapped cassette. **e.** Reconnect air supply. **f.** Power **ON** the automation line at Inlet Unit. **g.** Perform **STARTUP** at Line Controller. **4.** If the problem persists, call your Beckman Coulter Representative.
1-34	SN34	Sample Tube Unloading Arm in the home position did not initialize due to an obstruction or hardware failure.	Connection Unit Top View	C-7	**1.** Clear any obstruction. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
1-35	SN35	Sample Tube Unloading Arm in the near home position did not initialize due to an obstruction or hardware failure.	Connection Unit Top View	C-7	**1.** Clear any obstruction. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
1-36	SN36	Sample tube Unloading Arm in the limit position did not initialize due to an obstruction or hardware failure.	Connection Unit Top View	C-5	**1.** Clear any obstruction. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.

Table 6.1 Connection Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
1-37	SN37	Scenarios: **1.** Cassette was not detected inside the Load Shuttle cassette position #3. **2.** Cassette incorrectly detected inside Load Shuttle during Startup.	Connection Unit Top View	D-7	**1.** If error occurs when cassette is pushed into the Load Shuttle: **a.** Open the right-side tabletop safety cover. **b.** Slide cassette to the right so the SN37 Orange LED is ON. **c.** Replace the right-side tabletop safety cover. **d.** Press **PAUSE**/**RUN** to clear the error. **2.** If the problem occurs immediately after Startup: **a.** Open the right-side tabletop safety cover. **b.** Remove cassette from inside the Load Shuttle cassette position #3. **c.** Replace the right-side tabletop safety cover.
1-38	SN38	One of two limit sensors associated with cylinder SL28 Right Side Load Cassette Shuttle, position #3.	Connection Unit Top View	D-7	This error occurs during Power On, if the sensor is defective. If the problem persists, call your Beckman Coulter Representative.
1-39	SN39	One of two limit sensors associated with cylinder SL28 Right Side Load Cassette Shuttle, position #4.	Connection Unit Top View	C-7	This error occurs during Power On, if the sensor is defective. If the problem persists, call your Beckman Coulter Representative.
1-40	SN40	Problem associated with moving the cassette in and out of cassette position #2 (Tube pushup and unload area).	Connection Unit Top View	C-6	**1.** Press **PAUSE**/**RUN** to clear the error. **2.** If the problem persists: **a.** Open the right-side tabletop safety cover. **b.** Ensure the cassette has traveled from cassette position #1 to cassette position #2. **c.** Ensure the Tube Unloading Arm finger is trying to engage the cassette in order to move it. **3.** If the problem persist, **a.** When the cassette has already moved to position #2 and the Load Shuttle is at the back position #3, then move the cassette to position #3. **b.** Replace the right-side tabletop safety cover and press P**AUSE**/**RUN** to clear the error. **4.** If the problem continues to persist, call your Beckman Coulter Representative.

Table 6.1 Connection Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
1-41	SN41	Scenarios: **1.** Fiber optic sensor did not detect a sample tube at Connection Unit bar-code reader cup (BR01) after attempting to insert a tube in the cup. **2.** Fiber optic sensor incorrectly detected a sample tube left at Connection Unit bar-code reader cup (BR01) after unloading the tube.	Connection Unit Side View	C-4	**1.** Ensure whether a sample tube is present at bar-code reader BR01. **2.** If there is no sample tube located at BR01, (1) **a.** Locate the sample tube in the Loading Elevator. **b.** Place sample tube in front of BR01. **c.** Press **PAUSE**/**RUN** to clear the error. **3.** If there is a sample tube located at BR01, (2) **a.** Remove sample tube in front of BR01. **b.** Press **PAUSE**/**RUN** to clear the error. **4.** If followed by Error Code 1-49: **a.** Place sample tube in cassette directly in front of sensor. 1-49 with the label facing towards the rear of the instrument. **b.** Press **PAUSE**/**RUN** to clear the error.
1-42	SN42	One of two limits sensors for the Loading Elevator cylinder SL49, (down sensor error).	Connection Unit Side View	D-5	This error occurs during Power On, if the sensor is defective. **1.** Press **PAUSE**/**RUN** to clear the error. **2.** If the problem persists, call your Beckman Coulter Representative.
1-43	SN43	One of two limits sensors for the Loading Elevator cylinder SL49 (up sensor error).	Connection Unit Side View	D-6	This error occurs during Power On if the sensor is defective. **1.** Press **PAUSE**/**RUN** to clear the error. **2.** If the problem persists, call your Beckman Coulter Representative.
1-44	SN44	Fiber optic sensor did not detect a sample tube at the lower position of the Unloading Elevator.	Connection Unit Side View	C-5	**1.** Ensure sample tube was loaded into Unloading Elevator sample tube carrier. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
1-45	SN45	One of two limits sensors for the Unloading Elevator cylinder SL51 (down sensor error)	Connection Unit Side View	D-5	This error occurs during Power On, if the sensor is defective. **1.** Press **PAUSE**/**RUN** to clear the error. **2.** If the problem persists, call your Beckman Coulter Representative.
1-46	SN46	One of two limits sensors for the Unloading Elevator cylinder SL51 (up sensor error)	Connection Unit Side View	D-6	This error occurs during Power On, if the sensor is defective. **1.** Press **PAUSE**/**RUN** to clear the error. **2.** If the problem persists, call your Beckman Coulter Representative.

Table 6.1 Connection Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
1-47	SN47	Safety cover over the Right-side Cassette Loading Arm was off or not properly positioned.	Connection Unit Loading and Unloading Arms	A-5	**1.** Ensure Loading Arm safety cover on the right is properly positioned so that the sensor's Red LED is ON. **2.** Press **PAUSE**/**RUN** to clear the error.
1-48	SN48	Safety cover over the Left-side Cassette Unloading Arm was off or not properly positioned.	Connection Unit Loading and Unloading Arms	A-2	**1.** Ensure Unloading Arm safety cover on the left-side is properly positioned so that the sensor's Red LED is ON. **2.** Press **PAUSE**/**RUN** to clear the error.
1-49	SN49	Fiber optic sensor did not detect the sample tube being loaded by the Sample Tube Loading Arm at the following locations: **1.** Loading Elevator sample carrier when it's down inside the Connection pickup point. **2.** When inserting tubes in the cassette at position #4 of the Cassette Handling mechanism.	Connection Unit Side View	C-3	**1.** Locate the missing sample tube in either the loading elevator or in front of BR01. **2.** Locate fiber optic sensor 1-49 and place the sample tube directly in front of sensor 1-49 in either: **a.** the sample tube holder next to BR01, or **b.** the cassette in position #4 with the label facing towards the rear of the instrument (depending on location of fiber optic sensor 1-49.) **3.** Press **PAUSE**/**RUN** to clear the error.
1-50	SN50	Fiber optic sensor detected a sample tube was left in the cassette by the Sample Tube Unloading Arm.	Connection Unit Side View	C-2	**1.** Locate sample tube in the cassette in front of fiber optic sensor (SN50). **2.** Remove the sample tube. **3.** Press **PAUSE**/**RUN** to clear the error. **4.** If followed by Error Code 1-44: **a.** Place the sample tube in the unloading elevator sample tube holder beside SN44. **b.** Press **PAUSE**/**RUN** to clear the error.
1-61	SN61	Sample tube carrier error in the area in front of the Conveyor Lane bar-code reader BR02.	Connection Unit Conveyor	D-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.

Table 6.1 Connection Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
1-62	SN62	Sample tube carrier error in the area in front of the Conveyor Lane bar-code reader BR02	Connection Unit Conveyor	D-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
1-65	SN65	Proximity sensor SN65 did not detect in time the arrival of the sample tube carrier, located before the Conveyor Loading Arm.	Connection Unit Conveyor	C-4	**1.** Clear any obstruction. **2.** Press **PAUSE**/**RUN** to clear the error.
1-66	SN66	Proximity sensor SN66 did not detect in time the arrival of the sample tube carrier, located at the Conveyor Loading Arm.	Connection Unit Conveyor	D-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
1-67	SN67	Fiber optic sensor detected a sample tube was left in the sample tube carrier, located at the Conveyor Loading Arm.	Connection Unit Conveyor	D-4	**1.** Place the sample tube into the Loading Elevator. **2.** Press **PAUSE**/**RUN** to clear the error.
1-68	SN68	Proximity sensor SN68 did not detect the arrival of the tube carrier that had just left the Loading Arm area.	Connection Unit Conveyor	D-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
1-69	SN69	Fiber optic sensor detects that a tube was not off-loaded from the Unloading Elevator.	Connection Unit Conveyor	B-4	**1.** Locate the sample tube and place in the sample tube carrier next to SN69. **2.** Press **PAUSE**/**RUN** to clear the error.
1-70	SN70	Proximity sensor SN70 error indicates the expected sample tube carrier did not arrived in the allotted time.	Connection Unit Conveyor	D-5	**1.** Press **PAUSE**/**RUN** to clear the error. **2.** If the problem persists: **a.** Place a metal object in front of sensor 1-70. **b.** Press **PAUSE**/**RUN** to clear the error.
1-71	SN71	One of two limit sensors for the Conveyor Loading Arm cylinder SL72.	Connection Unit Conveyor	C-3	This error occurs during Power On, if the sensor is defective. **1.** Press **PAUSE**/**RUN** to clear the error. **2.** If the problem persists, call your Beckman Coulter Representative.

Table 6.1 Connection Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
1-72	SN72	One of two limit sensors for the Conveyor Loading Arm cylinder SL72.	Connection Unit Conveyor	C-3	This error occurs during Power On, if the sensor is defective. **1.** Press **PAUSE**/**RUN** to clear the error. **2.** If the problem persists, call your Beckman Coulter Representative.
1-73	SN73	One of two limit sensors for the Conveyor Loading Arm cylinder SL74.	Connection Unit Conveyor	C-5	This error occurs during Power On, if the sensor is defective. **1.** Press **PAUSE**/**RUN** to clear the error. **2.** If the problem persists, call your Beckman Coulter Representative.
1-74	SN74	One of two limit sensors for the Conveyor Loading Arm cylinder SL74.	Connection Unit Conveyor	C-5	This error occurs during Power On, if the sensor is defective. **1.** Press **PAUSE**/**RUN** to clear the error. **2.** If the problem persists, call your Beckman Coulter Representative.
1-75	SN75	Sample tube carrier error at Conveyor Unloading Arm indicates the expected tube carrier did not arrive in the allotted time.	Connection Unit Conveyor	B-4	**1.** Clear any obstruction. **2.** Ensure a sample tube carrier is available to off load the waiting sample tube. **3.** Press **PAUSE**/**RUN** to clear the error.
2-01	SL01	During its operation Cassette Loading Arm cylinder SL01 did not fully extend and misses activating the limit sensor. The two limit sensors are AS01 (down) and AS02 (up).	Connection Unit Loading and Unloading Arms	B-7	**1.** Ensure the cassette loading arm fingers align with sample tube positions #1 and #5 of the cassette and the positions are empty. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
2-02	SL02	During its operation Cassette Loading Arm cylinder SL02 did not fully extend and misses activating the limit sensor. The two limit sensors for SL02 are AS03 (down) and AS04 (up).	Connection Unit Loading and Unloading Arms	B-7	**1.** Ensure the cassette loading arm fingers align with sample tube positions #1 and #5 of the cassette and the positions are empty. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.

Table 6.1 Connection Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
2-03	SL03	During its operation Cassette Loading Arm cylinder SL03 did not swing up/down and misses activating the limit sensor. The two limit sensors for SL03 are AS06 (down) and AS05 (up).	Connection Unit Loading and Unloading Arms	B-7	**1.** Clear any obstruction. **2.** Ensure cassette is properly seated on loading arm fingers. **3.** Press **PAUSE**/**RUN** to clear the error. **4.** If the problem persists, call your Beckman Coulter Representative.
2-04	SL04	During its operation Cassette Unloading Arm cylinder SL04 did not fully extend and misses activating the limit sensor. The two limit sensors are AS07 (down) and AS08 (up).	Connection Unit Loading and Unloading Arms	B/C-1	**1.** Ensure the cassette loading arm fingers align with sample tube positions #8 and #12 of the cassette and the positions are empty. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
2-05	SL05	During its operation Cassette Unloading Arm cylinder SL05 did not fully extend and misses activating the limit sensor. The two limit sensors are AS09 (down) and AS10 (up).	Connection Unit Loading and Unloading Arms	B-1	**1.** Ensure the cassette loading arm fingers align with sample tube positions #8 and #12 of the cassette and the positions are empty. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
2-06	SL06	During its operation Cassette Unloading Arm cylinder SL06 did not swing up/down and misses activating the limit sensor. The two limit sensors are AS12 (down) and AS11 (up.)	Connection Unit Loading and Unloading Arms	B-1	**1.** Clear any obstruction. **2.** Ensure cassette is properly seated on loading arm fingers. **3.** Press **PAUSE**/**RUN** to clear the error. **4.** If the problem persists, call your Beckman Coulter Representative.

Table 6.1 Connection Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
2-21	SL21	Cassette jam was detected in cassette load position #5. Cassette could be jammed by Stopper cylinder SL21.	Connection Unit Top View	C-4	**1.** Press **PAUSE**/**RUN** to clear the error. **2.** If the problem persists: **a.** Open the right-side tabletop safety cover. **b.** Ensure cassette is not trapped by Stopper cylinder SL21 at shuttle position #5. **3.** If unable to remove trapped cassette: **a.** Perform **SHUTDOWN** at Line Controller. **b.** Power **OFF** automation line at Inlet Unit. **c.** Cut off incoming lab air supply to the line. (If June-air compressor, turn Red Valve in back of Compressor Unit). **d.** Manually depress air cylinder (SL21) and then remove trapped cassette. **e.** Reposition the cassette in position #5. **f.** Reconnect air supply. **g.** Power **ON** the automation line at Inlet Unit. **h.** Perform **STARTUP** at Line Controller. **4.** If the problem persists, call your Beckman Coulter Representative.
2-22	SL22	Cassette may be jammed between cassette position #6 and cassette position #7.	Connection Unit Top View	D-3	**1.** Open the left lower front cover. **2.** Clear any obstructions if possible. **3.** Remove jammed cassette and place into cassette position #7. **4.** Replace covers. **5.** Press **PAUSE**/**RUN** to clear the error. **6.** If unable to remove trapped cassette” **a.** Perform **SHUTDOWN** at Line Controller. **b.** Power **OFF** automation line at Inlet Unit. **c.** Cut off incoming lab air supply to the line. (If June-air compressor, turn Red Valve in back of Compressor Unit.) **d.** Manually depress air cylinder (SL22) and then remove trapped cassette. **e.** Reposition the cassette in position #6. **f.** Reconnect air supply. **g.** Power **ON** the automation line at Inlet Unit. **h.** Perform **STARTUP** at Line Controller. **7.** If the problem persists, call your Beckman Coulter Representative.

Table 6.1 Connection Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
2-23	SL23	Stopped cassette error at cassette position #6. Cassette could be jammed.	Connection Unit Top View	D-2	**1.** Open the left lower front cover. **2.** Ensure cassette is properly positioned at cassette position #6. **3.** Replace covers. **4.** Press **PAUSE**/**RUN** to clear the error. If unable to remove trapped cassette" **a.** Perform **SHUTDOWN** at Line Controller. **b.** Power **OFF** automation line at Inlet Unit. **c.** Cut off incoming lab air supply to the line. (If June-air compressor, turn Red Valve in back of Compressor Unit.) **d.** Manually depress air cylinder (SL23) and then remove trapped cassette. **e.** Reposition the cassette in position #6. **f.** Reconnect air supply. **g.** Power **ON** the automation line at Inlet Unit. **h.** Perform **STARTUP** at Line Controller. **5.** If recovery is not possible, call your Beckman Coulter Representative.
2-24	SL24	The analyzed cassette is held at cassette position #7 in the Left Side Cassette Shuttle. The Cassette Unloading Arm cannot release the cassette.	Connection Unit Top View	D-2	**1.** Press **PAUSE**/**RUN** to clear the error. If arm cannot release cassette: **a.** Open the left lower front cover. **b.** Press down on the cassette to ensure cassette releases from Cassette Unloading Arm. **c.** Replace covers. **d.** Press PAUSE/RUN to clear the error. **2.** If recovery is not possible, call your Beckman Coulter Representative.
2-25	SL25	Left Side Cassette Unload Shuttle movement is obstructed.	Connection Unit Top View	C/D-2	**1.** Open the left lower front cover. **2.** Clear any obstructions. **3.** Replace covers. **4.** Press **PAUSE**/**RUN** to clear the error. **5.** If the problem persists, call your Beckman Coulter Representative.

Table 6.1 Connection Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
2-26	SL26	Cassette Ejector cylinder SL26 did not fully extend and misses activating the limit sensor. The cassette did not move from shuttle position #8. Cassette could be jammed. The two limit sensors are SN30 and SN31.	Connection Unit Top View	C-1/2	**1.** Open the left lower front cover. **2.** Clear obstruction or cause for jamming of the cassette ejector. **3.** Replace covers. **4.** Press **PAUSE**/**RUN** to clear the error. **5.** If the problem persists, call your Beckman Coulter Representative.
2-27	SL27	Cassette Stopper cylinder SL27 may have trapped the cassette at cassette position #1.	Connection Unit Top View	C-5	**1.** Press **PAUSE**/**RUN** to clear the error. **2.** If the problem persists: **a.** Open the right-side tabletop safety cover. **b.** Ensure there is no obstruction (cassette trapped by Stopper at shuttle position #1). **c.** Clear any obstructions if possible. **d.** Replace the right-side tabletop safety cover. **e.** Press **PAUSE**/**RUN** to clear the error. **3.** If unable to remove trapped cassette: **a.** Perform **SHUTDOWN** at Line Controller **b.** Power **OFF** automation line at Inlet Unit. **c.** Cut off incoming lab air supply to the line. (If June-air compressor, turn Red Valve in back of Compressor Unit). **d.** Open the right-side tabletop safety cover. **e.** Manually depress air cylinder (SL27) and then remove trapped cassette. **f.** Reconnect air supply. **g.** Replace covers. **h.** Power **ON** the automation line at Inlet Unit. **i.** Perform **STARTUP** at Line Controller. **4.** If the problem persists, call your Beckman Coulter Representative.
2-28	SL28	Right Side Cassette Shuttle Load movement is obstructed.	Connection Unit Top View	C/D-7	**1.** Open the left lower front cover. **2.** Clear any obstructions. **3.** Replace covers. **4.** Press **PAUSE**/**RUN** to clear the error. **5.** If the problem persists, call your Beckman Coulter Representative.

Table 6.1 Connection Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
2-41	SL41	Sample Tube Loading Arm cylinder did not extend / retract properly and misses activating the limit sensor. Cassette may be misaligned. The limit sensors are AS41 (down) and AS42 (up).	Connection Unit Side View	B-3	**1.** Press **PAUSE**/**RUN** to clear the error **2.** If the problem persists,: **a.** Ensure proper alignment of cassette position #12 and SL41 finger. **b.** Clear any obstruction if possible. **c.** Replace covers. **d.** Ensure proper alignment of cassette position #12 and SL41. **e.** Clear obstruction if possible. **f.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
2-42	SL42	Sample Tube Loading Arm cylinder SL42 did not fully extend / retract and was unable to activate its limit sensor. The sample tube gripper may have tried to insert another sample tube into a cassette that already contains a sample tube. The limit sensors are AS43 (up) and AS44 (down).	Connection Unit Side View	C-3	**1.** Open the right-side tabletop safety cover. **2.** Ensure cassette at loading position #4 is fully seated to the right in the cassette shuttle. **3.** Ensure alignment of the sample tube in the Sample Tube Loading Arm gripper fingers and the cassette position immediately in front of SN49. **4.** Replace covers. **5.** Press **PAUSE**/**RUN** to clear the error. **6.** If the problem persists, call your Beckman Coulter Representative.
2-44	SL44	Sample Tube Unloading Arm cylinder SL44 did not fully extend / retract and was unable to activate its limit sensor. Sample Tube Unloading Arm gripper error removing the sample tubes from cassette to the Unloading Elevator. The limit sensors are AS46 (up) and AS45 (down).	Connection Unit Side View	B-2	**1.** Open the right-side tabletop safety cover. **2.** Ensure cassette is aligned at unloading position #3. **3.** Ensure alignment of the sample tube in the Sample Tube Unloading Arm gripper fingers and the cassette position immediately in front of SN50. **4.** Replace covers. **5.** Press **PAUSE**/**RUN** to clear the error. **6.** If the problem persists, call your Beckman Coulter Representative.

Table 6.1 Connection Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
2-45	SL45	Sample Tube Unloading Arm cylinder SL45 did not fully extend / retract and was unable to activate its limit sensor. The limit sensors are AS48 (up) and AS47 (down).	Connection Unit Side View	C-2	**1.** Press **PAUSE**/**RUN** to clear the error. **2.** If the problem persists: **a.** Open the right-side tabletop safety cover. **b.** Ensure proper cassette alignment or clear any obstructions. **c.** Replace covers. **d.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
2-47	SL47	Sample tube(s) pusher cylinder SL47 did not fully extend and misses activating its limit sensor. It may not be able to push tubes up to unload them from cassette. The limit sensors are AS49 (up) and AS50 (down).	Connection Unit Side View	D-2	**1.** Press **PAUSE**/**RUN** to clear the error. **2.** If the problem persists: **a.** Open the right-side tabletop safety cover. **b.** Ensure there are not too many labels on a tube not allowing tubes to be pushed up to unload. **c.** Ensure proper cassette alignment or clear any obstruction. **d.** Replace covers. **e.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
2-48	SL48	Vertical Load Elevator cylinder SL48 did not fully extend / retract and misses activating its limit sensor. The error occurs as the loading holder moves the sample tube carrier up or down. The limit sensors are AS51 (up) and AS52 (down).	Connection Unit Side View	D-5	**1.** Press **PAUSE**/**RUN** to clear the error. **2.** If loading elevator does not move up or down: **a.** Look into the Conveyor cover hole for the Elevator carrier. **b.** Verify there are no obstructions in the path of the Elevator carrier. **c.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
2-49	SL49	Loading Elevator cylinder SL49 did not fully extend / retract as the loading holder moved the sample up or down and misses activating its limit sensor. The limit sensors are SN42 (down) and SN43 (up).	Connection Unit Side View	D-5	**1.** Press **PAUSE**/**RUN** to clear the error. **2.** If loading elevator does not move up or down: **a.** Look into the Conveyor cover hole for the Elevator carrier. **b.** Verify there are no obstructions in the path of the Elevator carrier. **c.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.

Table 6.1 Connection Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
2-50	SL50	Vertical Unload Elevator cylinder SL50 did not fully extend / retract and miss activating its limit sensor. The errors occur as the loading holder moves the sample tube carrier up or down. The limit sensors are AS53 (up) and AS54 (down).	Connection Unit Side View	D-5	**1.** Press **PAUSE**/**RUN** to clear the error. **2.** If loading elevator does not move up or down: **a.** Look into the Conveyor cover hole for the Elevator carrier. **b.** Verify there are no obstructions in the path of the Elevator carrier. **c.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
2-51	SL51	Loading Elevator cylinder SL49 did not fully extend / retract as the loading holder moved the sample up or down and misses activating its limit sensor. The limit sensors are SN45 (down) and SN46 (up).	Connection Unit Side View	D-5	**1.** Press **PAUSE**/**RUN** to clear the error. **2.** If loading elevator does not move up or down: **a.** Clear any obstruction. **b.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
2-61	SL61	Stopper error before the Conveyor Lane bar-code reader BR02.	Connection Unit Conveyor	D-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-62	SL62	Stopper error before the Conveyor Lane bar-code reader BR02.	Connection Unit Conveyor	D-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-63	SL63	Stopper error at the Conveyor Lane bar-code reader BR02.	Connection Unit Conveyor	D-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-64	SL64	Divider Arm error diverting a sample tube carrier to the Conveyor Loading Arm. Associated with limit sensors AS64 (retracted) and AS74 (extended).	Connection Unit Conveyor	D-4	**1.** Ensure the Divider Arm is free to extend and retract. **2.** Ensure the Divider arm is not slow to extend or retract. If so, the flow of air may have to be adjusted. **3.** Press **PAUSE**/**RUN** to clear the error. **4.** If the problem persists, call your Beckman Coulter Representative.

Table 6.1 Connection Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
2-65	SL65	Stopper error at Conveyor Loading Arm point "a".	Connection Unit Conveyor	D-4 a	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-66	SL66	Stopper error at Conveyor Loading Arm point "b".	Connection Unit Conveyor	D-4 b	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-67	SL67	Stopper error before Conveyor Unloading Arm.	Connection Unit Conveyor	C-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-68	SL68	Stopper error at Conveyor Unloading Arm.	Connection Unit Conveyor	C-4	**1.** Clear any obstruction. **2.** if a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-69	SL69	Divider Arm error diverting the sample carrier with an off-loaded sample tube from the Connection Unit to the conveyor on the main lane. Associated with AS69 (retracted) and AS75 (extended).	Connection Unit Conveyor	D-5	**1.** Ensure the Divider Arm is free to extend and retract. **2.** Ensure the Divider arm is not slow to extend or retract. If so, the flow of air may have to be adjusted. **3.** Press **PAUSE**/**RUN** to clear the error. **4.** If the problem persists, call your Beckman Coulter Representative.
2-70	SL70	Conveyor Loading Arm did not fully extend / retract while loading tubes onto the Elevator Sample Carrier and misses activating its limit sensor. The limit sensors are AS70 (up) and AS71 (down).	Connection Unit Conveyor	C-3	**1.** Clear any obstruction. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.

Table 6.1 Connection Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
2-71	SL71	Conveyor Loading Arm rotary cylinder SL71 error while swinging between the sample tube pick up pick-up position or the Loading Elevator position. The rotary cylinder limit sensors are SN71 and SN72.	Connection Unit Conveyor	C-3	**1.** Clear any obstruction. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
2-73	SL73	Conveyor Unloading Arm cylinder SL73 did not fully extend / retract while unloading tubes from the Unload Elevator Sample Carrier and misses activating its limit sensor. The limit sensors are AS72 (up) and AS73 (down).	Connection Unit Conveyor	C-5	**1.** Clear any obstruction. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
2-74	SL74	Conveyor Unloading Arm rotary cylinder SL74 error while swinging between the unload sample tube carrier position and the Unloading Elevator position. The rotary cylinder limit sensors SN73 and SN74.	Connection Unit Conveyor	C-5	**1.** Clear any obstruction. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the problem persists, call your Beckman Coulter Representative.
3-01	BR01	Failure of the Bar-code reader BR01. May have lost programming.	Connection Unit Top View	D-8	**1.** Perform **SHUTDOWN** at Line Controller. **2.** Enter the **System Setup** > **Maintenance** menu. Default Password=password1 **3.** Verify correct setting of bar-code label and exit screen. Upon exiting the screen the bar-code readers will be reprogrammed. **4.** If the problem persists, call your Beckman Coulter Representative.

Table 6.1 Connection Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
3-02	BR02	Failure of the Bar-code reader BR02. May have lost programming.	Connection Unit Conveyor	D-4	**1.** Perform **SHUTDOWN** at Line Controller. **2.** Enter the **System Setup** > **Maintenance** menu. Default Password=password1 **3.** Verify correct setting of bar-code label and exit screen. Upon exiting the screen the bar-code readers will be reprogrammed. **4.** If the problem persists, call your Beckman Coulter Representative.
4-01	PM01	Pulse Motor PM01 Error driving the Sample Tube Loading Arm.	Connection Unit Top View	D-5	**1.** Open the right-side tabletop safety cover. **2.** Manually move the Sample Tube Loading Arm approximately 1 foot to the left. **3.** Replace the right-side tabletop safety cover. **4.** Press **PAUSE**/**RUN** to clear the error.
4-02	PM02	Pulse Motor PM02 Error driving the Sample Tube Unloading Arm.	Connection Unit Top View	C-4	**1.** Open the right-side tabletop safety cover. **2.** Manually move the Sample Tube Loading Arm approximately 1 foot to the left. **3.** Replace the right-side tabletop safety cover. **4.** Press **PAUSE**/**RUN** to clear the error.
5-01	LH01 COM	Parallel communication error with the Analyzer: Cassette is ready to be loaded. The Analyzer did not issue load permission.	Connection Unit	None	**1.** Ensure the LH 750 is operational and ready to receive cassette. Analyzer may be unable to accept another cassette due to workload, reagent change or lengthy delay. **2.** Press **PAUSE**/**RUN** to clear the error.
5-02	LH02 TIM	Time out error at Analyzer while in STAT-CASS mode. Cassette Loading/Unloading Arm covers open beyond set time.	Connection Unit	None	**1.** Ensure the STAT-CASS mode of analysis is completed. **2.** Ensure the Loading and Unloading Arm safety covers are replaced and STAT-CASS mode is deselected. **3.** Press **PAUSE**/**RUN** to clear the error.
5-03	LH03 RACK	Improper cassette(s) located in the LH 750 Unloading Bay.	Connection Unit	None	**1.** Remove improper cassette(s) from LH 750 Unloading Bay. **2.** Press **PAUSE**/**RUN** to clear the error.
5-04	LH04 IN	Analyzer cassette delivery error: The LH 750 Analyzer received a cassette, but it was not loaded correctly.	Connection Unit	None	**1.** Ensure the cassette is loaded properly in the LH 750 Loading Bay. OR **2.** Ensure the cassette sensor on the LH 750 Analyzer is functioning properly. **3.** Press **PAUSE**/**RUN** to clear the error.

Table 6.1 Connection Unit Error Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
9-01	AM01	AC Synchronous Motor Failure while driving the Cassette Loading Arm up or down.	Connection Unit Loading and Unloading Arms	D-5	There is no user procedure to solve this problem. Call your Beckman Coulter Representative.
9-02	AM02	AC Synchronous Motor Failure driving the Cassette Unloading Arm.	Connection Unit Loading and Unloading Arms	D-3	There is no user procedure to solve this problem. Call your Beckman Coulter Representative.

a. See Abbreviations for a list of sensor codes.

CHAPTER 7

Connection Unit Conveyor

Connection Unit Conveyor Pictures

This chapter contains pictures of the Connection Unit Conveyor, Connection Unit Loading and Unloading Arms, Connection Unit Side View, Connection Unit Top and the associated diagrams.

Figure 7.1 Connection Unit Conveyor Side View

Figure 7.2 Connection Unit Conveyor Top View

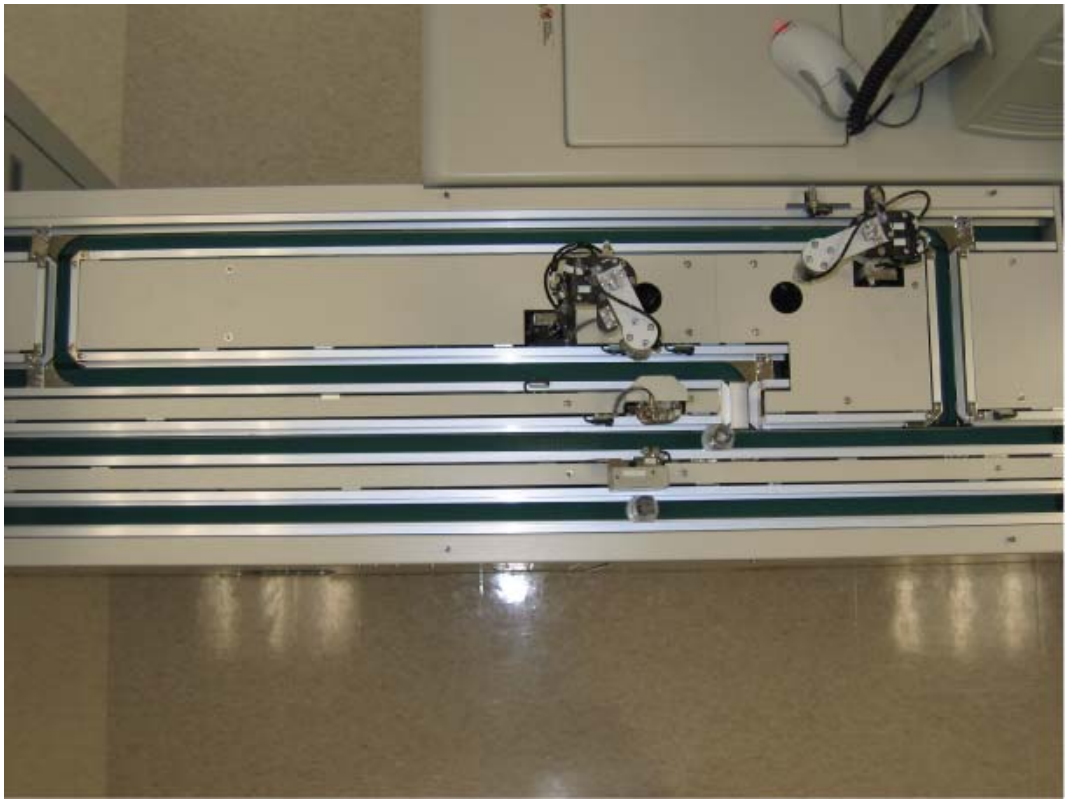
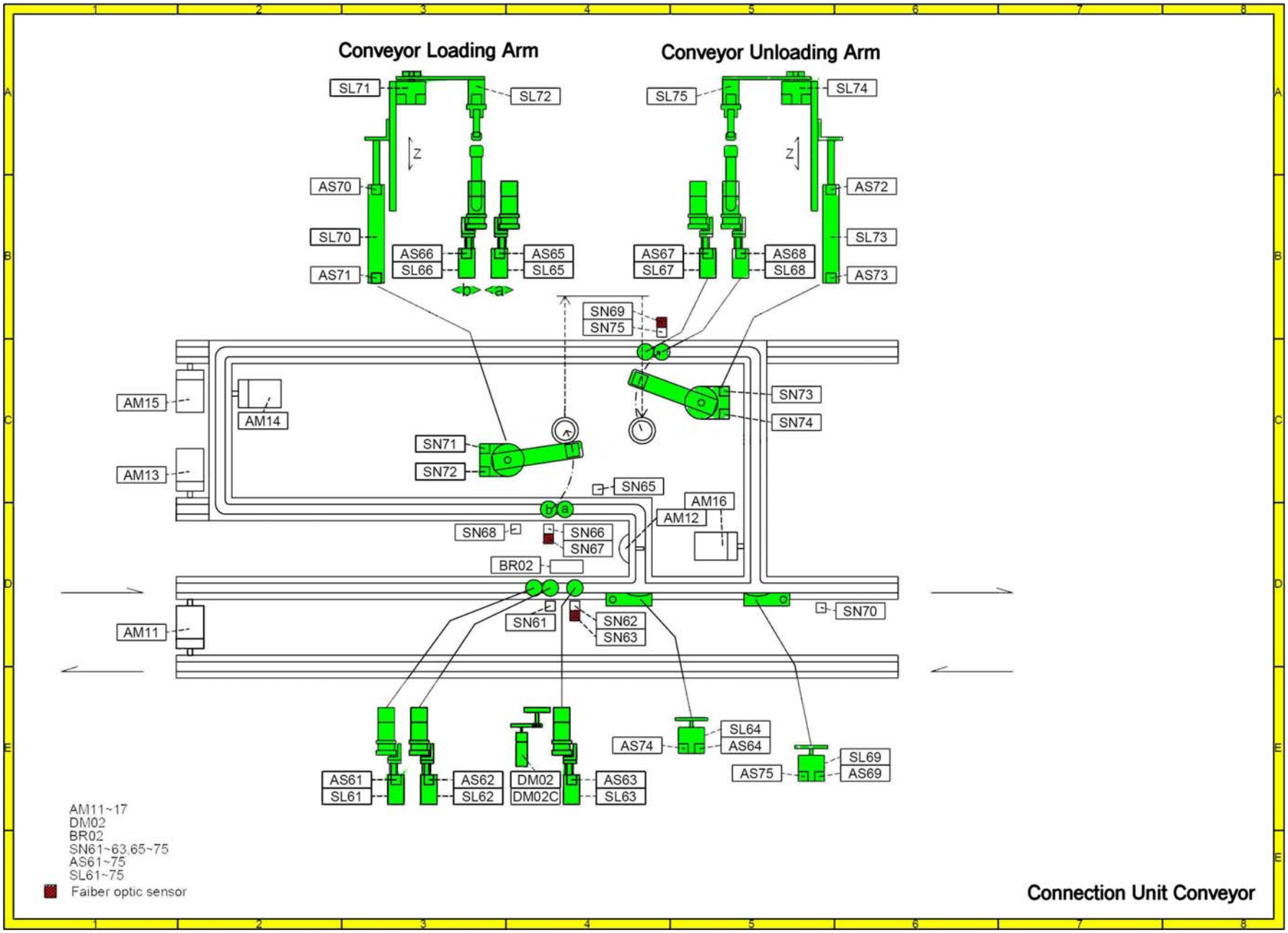


Figure 7.3 Connection Unit Conveyor

Connection Unit Conveyor



Sensor Codes

The sensor codes provide definitions of the alpha portion of the codes found in the **Sensor** column of the Error Code tables and Sensor diagrams.

1. AM = AC synchronous motor
2. AS = Magnetic autoswitch
3. BR = Bar-code reader
4. BZ = Audible alarm
5. DM = DC motor
6. LP = Lamp (keypad & warning light)
7. LS = Mechanical limit switch
8. PM = Pulse motor
9. SL = Pneumatic solenoid
10. SM = Stepper motor
11. SN = Sensor
12. SW = Keypad switch

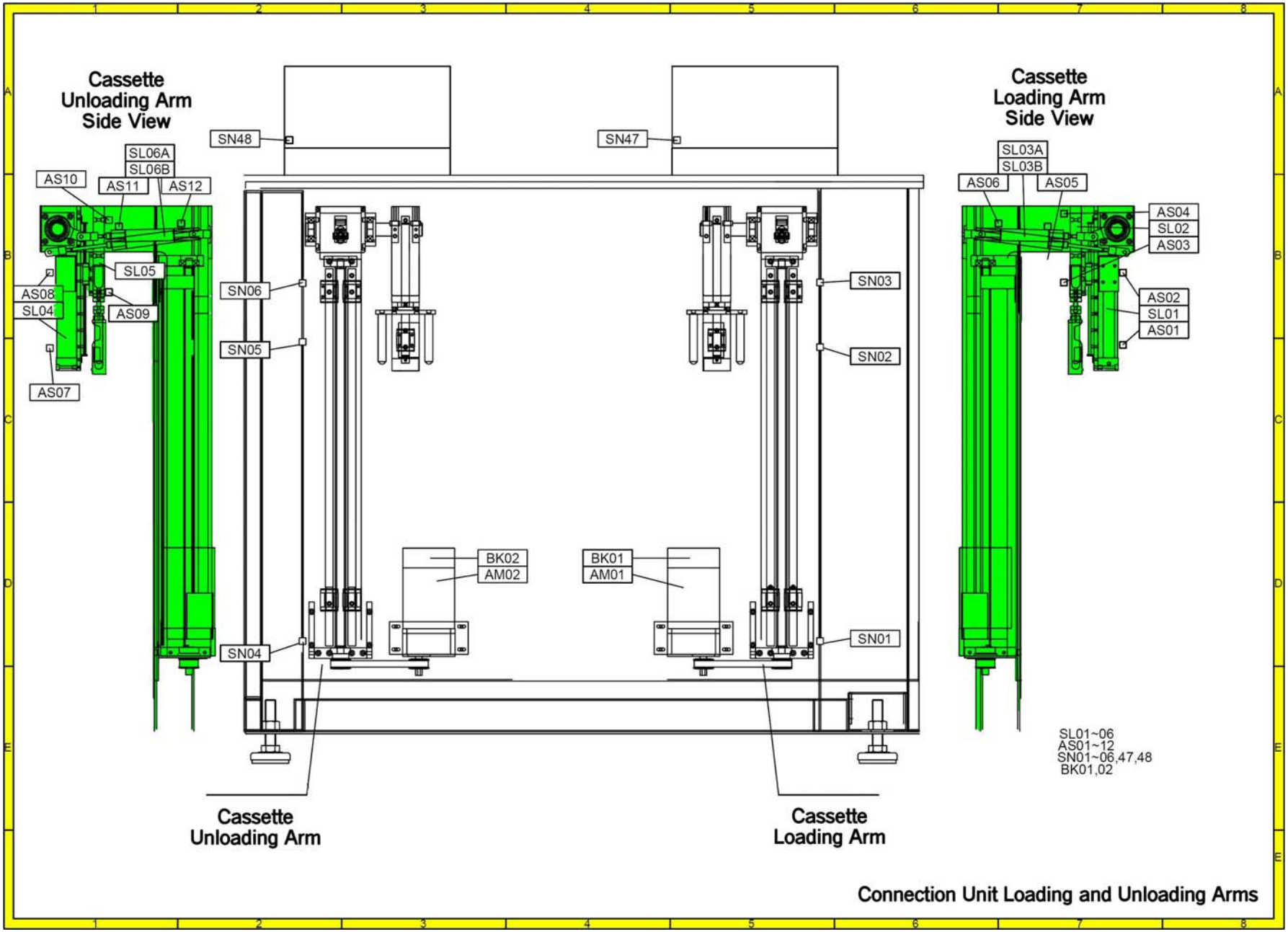
Connection Unit Loading and Unloading Arms (Pictures)

Figure 7.4 Connection Unit Overall View

Figure 7.5 Connection Unit Loading and Unloading Arms

Figure 7.6 Connection Unit Loading and Unloading Arms

Connection Unit Loading and Unloading Arms



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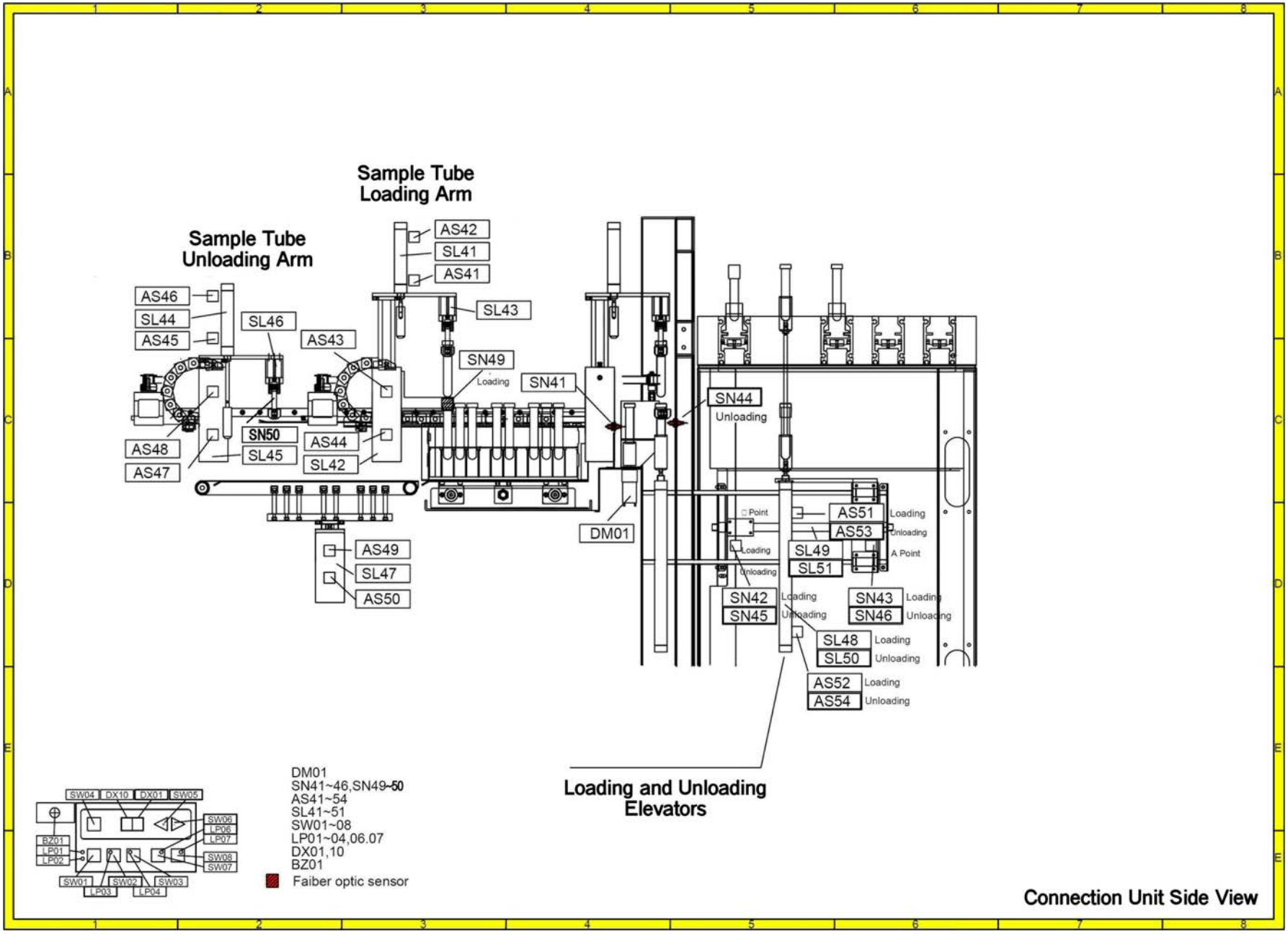
8. PM = Pulse motor
9. SL = Pneumatic solenoid
10. SM = Stepper motor
11. SN = Sensor
12. SW = Keypad switch

Connection Unit Side View (Pictures)

Figure 7.7 Connection Unit Overall View

Figure 7.8 Connection Unit Side View

Connection Unit Side View



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8. PM = Pulse motor
9. SL = Pneumatic solenoid
10. SM = Stepper motor
11. SN = Sensor
12. SW = Keypad switch

Connection Unit Top View (Pictures)

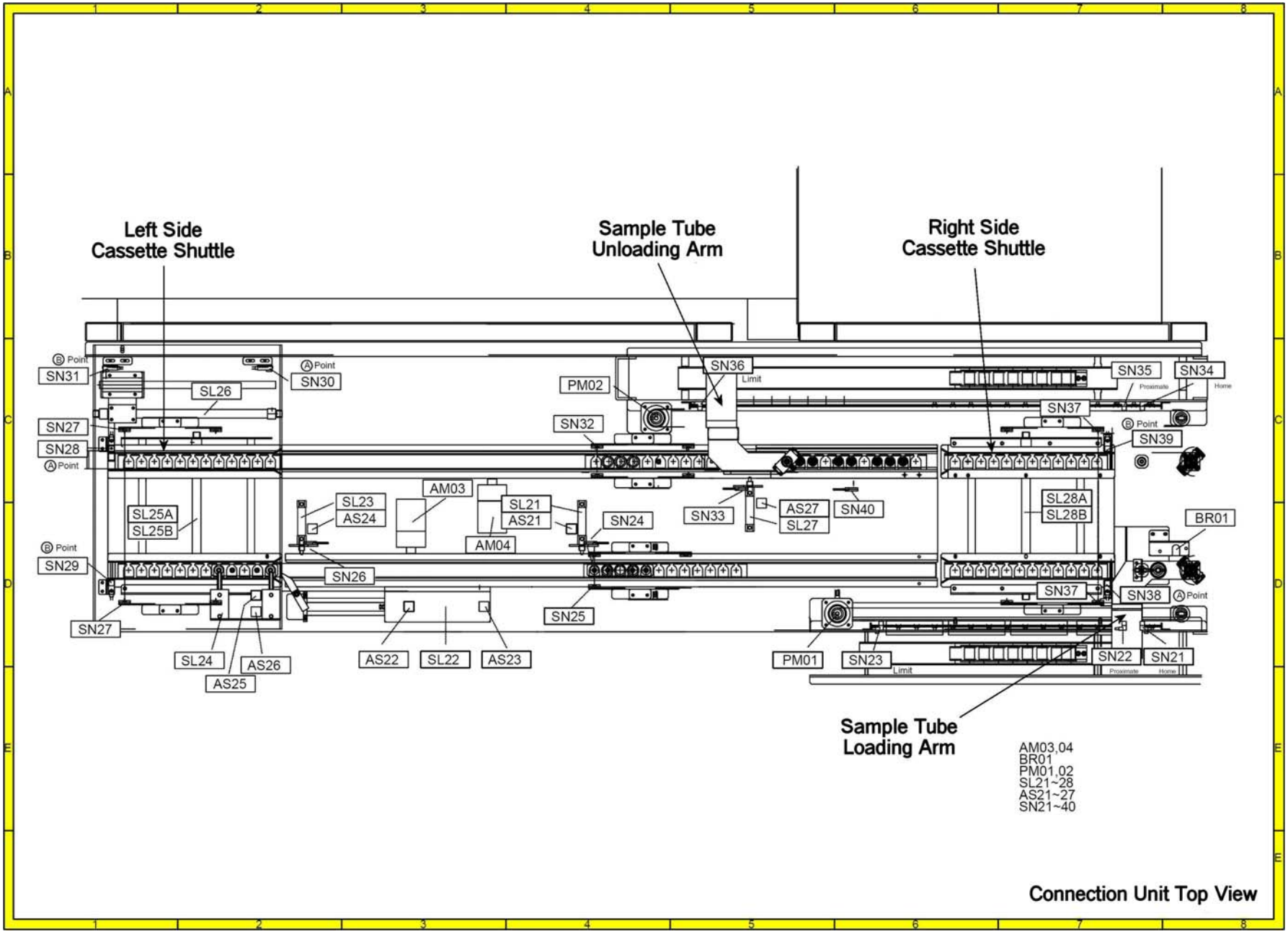
Figure 7.10 Connection Unit Overall View

Figure 7.11 Connection Unit Top View

Figure 7.12 Connection Unit Top Diagram

LH 1500 HEMATOLOGY AUTOMATION SYSTEM

Connection Unit Top View



Sensor Codes:

The sensor codes provide definitions of the alpha portion of the codes found in the **Sensor** column of the Error Code tables and Sensor diagrams.

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3. BR = Bar-code reader
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12. SW = Keypad switch

CHAPTER 8

Stockyard Unit

Stockyard Unit Error Recovery

The Stockyard Unit Error Code Table 8.1 describes error messages generated by the LH 1500 Hematology Automation System. The table provides the system error codes, the related sensor, a location reference point on the schematic diagram and a brief explanation of the possible problem and possible solutions.

Table 8.1 Stockyard Unit Error Recovery Codes

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
0-00	BZ00	Bar-code label did not read at the Stockyard bar-code reader BR01.	Stockyard Unit Conveyor	D-3	**1.** Ensure the bar-code is present and properly positioned. **2.** Turn the sample tube in the carrier at BR01 with bar-code facing the bar-code reader. **3.** Press **PAUSE**/**RUN** to clear the error.
0-11	BZ11	Bar-code label did not read at the Stockyard bar-code reader BR01.	Stockyard Unit Conveyor	D-3	**1.** Ensure the bar-code is present and properly positioned. **2.** Turn the sample tube in the carrier at BR01 with bar-code facing the bar-code reader. **3.** Press **PAUSE**/**RUN** to clear the error.
0-12	BZ12	Positioning error at the Stockyard bar-code reader BR01.	Stockyard Unit Conveyor	D-3	**1.** Ensure the bar-code is present and properly positioned. **2.** Turn the sample tube in the carrier at BR01 with bar-code facing the bar-code reader. **3.** Press **PAUSE**/**RUN** to clear the error.
0-13	BZ13	Invalid routing code at the Stockyard bar-code reader BR01. Additional sample programming caused a sorting conflict.	Stockyard Unit Conveyor	D-3	**1.** Remove the sample tube and press **ENTER**. **2.** Press **PAUSE**/**RUN** to clear the error.

Table 8.1 Stockyard Unit Error Recovery Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
0-21	BZ21	Stockyard bar-code reader error at BR02.	Stockyard Unit Conveyor	D-4	**1.** Ensure the bar-code is present and properly positioned. **2.** Turn the sample tube in the carrier at BR01 with bar-code facing the bar-code reader. **3.** Press **PAUSE**/**RUN** to clear the error.
0-22	BZ22	Positioning error at the Stockyard bar-code reader BR02.	Stockyard Unit Conveyor	D-4	**1.** Ensure the bar-code is present and properly positioned. **2.** Turn the sample tube in the carrier at BR01 with bar-code facing the bar-code reader. **3.** Press **PAUSE**/**RUN** to clear the error.
0-23	BZ23	Invalid route code at the Stockyard bar-code reader BR02. Additional sample programming caused a sorting conflict.	Stockyard Unit Conveyor	D-4	**1.** Remove the sample tube. **2.** Press **PAUSE**/**RUN** to clear the error.
1-04	SN04	Sample tube not present in the first level Stockyard Loading Shuttle Cup.	3000 Tube Stockyard Top View	E-4/5 C	**1.** Ensure sample tube is correctly loaded into Stockyard Loading Shuttle Cup. **2.** Press **PAUSE**/**RUN** to clear the error.
1-05	SN05	Sample tube not present in the first level Stockyard Retrieving Shuttle Cup.	3000 Tube Stockyard Top View	E-4/5 C	**1.** Ensure sample tube is correctly loaded into Stockyard Loading Shuttle Cup. **2.** Press **PAUSE**/**RUN** to clear the error.
1-21	SN21	Sample tube not present in the second level Stockyard Loading Shuttle Cup.	3000 Tube Stockyard Top View	E-4/5 C	**1.** Ensure sample tube is correctly loaded into Stockyard Loading Shuttle Cup. **2.** Press **PAUSE**/**RUN** to clear the error.
1-22	SN22	Sample tube not present in the second level Stockyard Retrieving Shuttle Cup.	3000 Tube Stockyard Top View	E-4/5 C	**1.** Ensure sample tube is correctly loaded into Stockyard Loading Shuttle Cup. **2.** Press **PAUSE**/**RUN** to clear the error.
1-32	SN32	Sample tube not present in the third level Stockyard Loading Shuttle Cup.	3000 Tube Stockyard Top View	E-4/5 C	**1.** Ensure sample tube is correctly loaded into Stockyard Loading Shuttle Cup. **2.** Press **PAUSE**/**RUN** to clear the error.
1-33	SN33	Sample tube not present in the third level Stockyard Retrieving Shuttle Cup.	3000 Tube Stockyard Top View	E-4/5 C	**1.** Ensure sample tube is correctly loaded into Stockyard Loading Shuttle Cup. **2.** Press **PAUSE**/**RUN** to clear the error.

Table 8.1 Stockyard Unit Error Recovery Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
1-40	SN40	Sample tube carrier error before the Stockyard bar-code reader BR01.	Stockyard Unit Conveyor	D-3	**1.** Ensure the sensor is operating correctly. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
1-43	SN43	Sample tube carrier error before the Stockyard bar-code reader BR01.	Stockyard Unit Conveyor	D-3	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
1-44	SN44	Fiber Optic sensor is detecting incorrectly the tube on the sample carrier. Stockyard Loading Arm gripper failed to pick up sample at Bar-code reader BR01	Stockyard Unit Conveyor	D-3	**1.** Remove the sample tube from the sample tube holder in front of SN44 and place the sample tube in the Stockyard Loading Arm gripper fingers. **2.** Press **PAUSE**/**RUN** to continue. **NOTE** DO NOT place the sample tube in the sample tube holder below the Stockyard Loading Arm gripper. This may cause the Stockyard Loading Arm to bend, or cause sample tube breakage.
1-45	SN45	Sample tube carrier error before the Stockyard bar-code reader BR02.	Stockyard Unit Conveyor	D-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
1-46	SN46	Sample tube carrier error before the Stockyard bar-code reader BR02.	Stockyard Unit Conveyor	D-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
1-48	SN48	Sample tube carrier error at the Stockyard bar-code reader BR02.	Stockyard Unit Conveyor	D-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
1-49	SN49	Fiber optic sensor did not detect a sample tube at the Stockyard bar-code reader BR02 during a retrieval process.	Stockyard Unit Conveyor	D-4	**1.** Ensure the sample tube was retrieved from the Retrieving Shuttle Cup. **2.** Press **PAUSE**/**RUN** to clear the error.

Table 8.1 Stockyard Unit Error Recovery Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
1-51	SN51	Proximity sensor did not detect the expected sample tube carrier after it passed BR02.	Stockyard Unit Conveyor	D-5	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
1-52	SN52	Sample tube carrier error at the Stockyard waiting sample tube carrier queue.	Stockyard Unit Conveyor	D/E-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
1-55	SN55	Sample tube carrier error before the H-Lane.	Stockyard Unit T Lane	C-3	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
1-57	SN57	Sample tube carrier error at the T-Lane sample tube carrier sorting position #1.	Stockyard Unit T Lane	C-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
1-58	SN58	Proximity sensor did not detect a sample tube carrier after it entered the H-Lane.	Stockyard Unit T Lane	C-3/4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
1-59	SN59	Sample tube carrier error on the exit of the H-Lane.	Stockyard Unit T Lane	C-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
1-60	SN60	Sample tube carrier error at the T-Lane sample tube carrier sorting position #2.	Stockyard Unit T Lane	C-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
1-62	SN62	Proximity sensor did not detect a sample tube carrier arriving Stockyard waiting empty sample tube carrier queue.	Stockyard Unit T Lane	C-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.

Table 8.1 Stockyard Unit Error Recovery Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
1-63	SN63	Proximity sensor did not detect a sample tube carrier on return lane.	Stockyard Unit T Lane	D--4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
1-64	SN64	Sample tube carrier error coming from H-Lane incoming lane to make the turn to the return lane.	Stockyard Unit H Lane	B-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
1-65	SN65	Proximity sensor did not detect a sample tube carrier turning on H-Lane.	Stockyard Unit H Lane	B-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
1-67	SN67	Stockyard first level access door open.	3000 Tube Stockyard Top View	C-4/5	**1.** Close the door. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the error persists, call your Beckman Coulter Representative.
1-68	SN68	Stockyard second level access door open.	3000 Tube Stockyard Top View	C-4/5	**1.** Close the door. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the error purists, call your Beckman Coulter Representative.
1-69	SN69	Stockyard third level access door open.	3000 Tube Stockyard Top View	C-4/5	**1.** Close the door. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If the error purists, call your Beckman Coulter Representative.
2-01	SL01	Stockyard Loading Shuttle Cup error on first level.	3000 Tube Stockyard Top View	E-4/5 C	**1.** Ensure the Stockyard Loading Shuttle movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error.
2-02	SL02	Stockyard Retrieving Shuttle Cup error on first level.	3000 Tube Stockyard Top View	E-4/5 C	**1.** Ensure the Stockyard Retrieving Shuttle movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error.
2-03	SL03	Stockyard Internal Transfer Arm air cylinder error on first level moving up or down.	3000 Tube Stockyard Top View	D-4/5 D	**1.** Ensure the Stockyard Internal Transfer Arm air cylinder movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error.
2-05	SL05	Stockyard Internal Arm Pushing cylinder error on the first level.	3000 Tube Stockyard Top View	D-4/5 D	**1.** Ensure that Stockyard Internal Arm Pushing cylinder movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error.

Table 8.1 Stockyard Unit Error Recovery Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
2-06	SL06	Rotating cylinder error on the Stockyard Loading Elevator.	3000 Tube Stockyard Top View	E-4 A	**1.** Ensure the Stockyard Loading Elevator movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error.
2-08	SL08	Rotating cylinder error on the Stockyard Retrieving Elevator.	3000 Tube Stockyard Top View	E-5 B	**1.** Ensure the Stockyard Retrieving Elevator movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error.
2-10	SL10	Stockyard Loading Shuttle Cup error on second level.	3000 Tube Stockyard Top View	E-4/5 C	**1.** Ensure the Stockyard Loading Shuttle movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error.
2-11	SL11	Stockyard Retrieving Shuttle Cup error on second level.	3000 Tube Stockyard Top View	E-4/5 C	**1.** Ensure the Stockyard Retrieving Shuttle movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error.
2-12	SL12	Stockyard Internal Transfer Arm air cylinder error on second level moving up or down.	3000 Tube Stockyard Top View	D-4/5 D	**1.** Ensure the Stockyard Internal Transfer Arm air cylinder movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error.
2-14	SL14	Stockyard Internal Arm Pushing cylinder error on the second level.	3000 Tube Stockyard Top View	D-4/5 D	**1.** Ensure that Stockyard Internal Arm Pushing cylinder movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error.
2-15	SL15	Stockyard Loading Shuttle Cup error on third level.	3000 Tube Stockyard Top View	E-4/5 C	**1.** Ensure the Stockyard Loading Shuttle movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error.
2-16	SL16	Stockyard Retrieving Shuttle Cup error on third level.	3000 Tube Stockyard Top View	E-4/5 C	**1.** Ensure the Stockyard Retrieving Shuttle movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error.
2-17	SL17	Stockyard Internal Transfer Arm cylinder error on third level moving up or down.	3000 Tube Stockyard Top View	D-4/5 D	**1.** Ensure the Stockyard Internal Transfer Arm cylinder movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error.
2-19	SL19	Stockyard Internal Arm Pushing cylinder error on the third level.	3000 Tube Stockyard Top View	D-4/5 D	**1.** Ensure that Stockyard Internal Arm Pushing cylinder movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error.
2-40	SL40	Stopper error before the Stockyard bar-code reader BR01.	Stockyard Unit Conveyor	D-3	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.

Table 8.1 Stockyard Unit Error Recovery Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
2-41	SL41	Stopper error before the Stockyard bar-code reader BR01.	Stockyard Unit Conveyor	D-3	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-43	SL43	Stopper error at the Stockyard bar-code reader BR01.	Stockyard Unit Conveyor	D-3	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-44	SL44	Stopper error at the second stopper before the Stockyard bar-code reader BR02.	Stockyard Unit Conveyor	D-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-45	SL45	Stopper error at the stopper before the Stockyard bar-code reader BR02.	Stockyard Unit Conveyor	D-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-46	SL46	Stopper error at the Stockyard bar-code reader BR02.	Stockyard Unit Conveyor	D-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-48	SL48	Stopper error at the Stockyard waiting empty sample tube carrier queue.	Stockyard Unit Conveyor	E-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-49	SL49	Stopper error at the Stockyard waiting empty sample tube carrier queue.	Stockyard Unit Conveyor	E-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-50	SL50	Stockyard Divider Arm error at the sample tube carrier waiting lane sorting position.	Stockyard Unit Conveyor	D-4	**1.** Ensure the gate is free to extend and retract. **2.** Ensure the gate arm is not to slow to extend/ retract. If so, the cylinder air flow controller may need adjustment. **3.** Press **PAUSE**/**RUN** to clear the error.

Table 8.1 Stockyard Unit Error Recovery Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
2-55	SL55	Stopper error at the T-Lane before sorting position.	Stockyard Unit T Lane	C-3	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-56	SL56	Stopper error at the T-Lane sorting position.	Stockyard Unit T Lane	C-3	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-57	SL57	Stockyard Divider Arm error at the entrance of H Lane.	Stockyard Unit T Lane	C-3	**1.** Ensure the gate is free to extend and retract. **2.** Ensure the gate arm is not to slow to extend/ retract. If so, the cylinder air flow controller may need adjustment. **3.** Press **PAUSE**/**RUN** to clear the error.
2-58	SL58	Stopper error at the exit of the H-Lane.	Stockyard Unit T Lane	C-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-59	SL59	Stopper error at the exit of the H-Lane.	Stockyard Unit T Lane	C-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-60	SL60	Stopper error at the T-Lane sample tube carrier sorting position #1.	Stockyard Unit T Lane	C-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-61	SL61	Stopper error at the T-Lane sample tube carrier sorting position #2.	Stockyard Unit T Lane	C-4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-62	SL62	Stockyard Divider Arm error at the T-Lane sample tube carrier sorting position #2.	Stockyard Unit T Lane	C-4	**1.** Ensure the gate is free to extend and retract. **2.** Ensure the gate arm is not to slow to extend/ retract. If so, the cylinder air flow controller may need adjustment. **3.** Press **PAUSE**/**RUN** to clear the error.

Table 8.1 Stockyard Unit Error Recovery Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
2-63	SL63	Stopper error at the H-Lane empty sample tube carrier lane.	Stockyard Unit H Lane	B-3/4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
2-64	SL64	Stopper error at the H-Lane empty sample tube carrier lane.	Stockyard Unit H Lane	B-3/4	**1.** Clear any obstruction. **2.** If a sample tube carrier is jammed, gently twist and push the sample tube carrier in the direction of least resistance. **3.** Press **PAUSE**/**RUN** to clear the error.
3-01	BR01	Failure of the Bar-code reader BR01 to read. May have lost its programming.	Stockyard Unit Conveyor	D-3	**1.** Perform **SHUTDOWN** at Line Controller. **2.** Enter the **System Setup**, **Maintenance** menu. Default Password=password1 **3.** Verify correct setting of bar-code label and exit screen. Upon exiting the screen, the bar-code readers will be reprogrammed. **4.** If the problem persists, call your Beckman Coulter Representative.
3-02	BR02	Failure of the Bar-code reader BR02 to read. May have lost its programming.	Stockyard Unit Conveyor	D-4	**1.** Perform **SHUTDOWN** at Line Controller. **2.** Enter the **System Setup**, **Maintenance** menu. Default Password=password1 **3.** Verify correct setting of bar-code label and exit screen. Upon exiting the screen, the bar-code readers will be reprogrammed. **4.** If the problem persists, call your Beckman Coulter Representative.
4-01	SM01	Failure to move the Stockyard Transfer Arm on the first level in the X-axis direction.	3000 Tube Stockyard Top View	D-4/5 D	**1.** Ensure the Stockyard Transfer Arm movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If there is no obstruction: **a.** Power **OFF** Stockyard Unit, wait one minute and then Power **ON** the Stockyard Unit to reset. **b.** Place Stockyard in **AUTO** mode to initialize. **4.** If the problem persists, call your Beckman Coulter Representative.

Table 8.1 Stockyard Unit Error Recovery Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
4-02	SM02	Failure to move the Stockyard Transfer Arm on the first level in the Y-axis direction.	3000 Tube Stockyard Top View	C-4/5	**1.** Ensure the Stockyard Transfer Arm movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If there is no obstruction: **a.** Power **OFF** Stockyard Unit, wait one minute and then Power **ON** the Stockyard Unit to reset. **b.** Place Stockyard in **AUTO** mode to initialize. **4.** If the problem persists, call your Beckman Coulter Representative.
4-03	SM03	Failure to move the Stockyard Loading Elevator in the Z-axis direction.	3000 Tube Stockyard Top View	E-4 A	**1.** Ensure the Stockyard Loading Elevator movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If there is no obstruction: **a.** Power **OFF** Stockyard Unit, wait one minute and then Power **ON** the Stockyard Unit to reset. **b.** Place Stockyard in **AUTO** mode to initialize. **4.** If the problem persists, call your Beckman Coulter Representative.
4-04	SM04	Failure to move the Stockyard Retrieving Elevator in the Z-axis direction.	3000 Tube Stockyard Top View	E-5 B	**1.** Ensure the Stockyard Retrieving Elevator movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If there is no obstruction: **a.** Power **OFF** Stockyard Unit, wait one minute and then Power **ON** the Stockyard Unit to reset. **b.** Place Stockyard in **AUTO** mode to initialize. **4.** If the problem persists, call your Beckman Coulter Representative.
4-05	SM05	Failure to move the Stockyard Transfer Arm on the second level in the X-axis direction.	3000 Tube Stockyard Top View	D-4/5 D	**1.** Ensure the Stockyard Transfer Arm movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If there is no obstruction: **a.** Power **OFF** Stockyard Unit, wait one minute and then Power **ON** the Stockyard Unit to reset. **b.** Place Stockyard in **AUTO** mode to initialize. **4.** If the problem persists, call your Beckman Coulter Representative.

Table 8.1 Stockyard Unit Error Recovery Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
4-06	SM06	Failure to move the Stockyard Transfer Arm on the second level in the Y-axis direction.	3000 Tube Stockyard Top View	C-4/5	**1.** Ensure the Stockyard Transfer Arm movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If there is no obstruction: **a.** Power **OFF** Stockyard Unit, wait one minute and then Power **ON** the Stockyard Unit to reset. **b.** Place Stockyard in **AUTO** mode to initialize. **4.** If the problem persists, call your Beckman Coulter Representative.
4-07	SM07	Failure to move the Stockyard Transfer Arm on the third level in the X-axis direction.	3000 Tube Stockyard Top View	D-4/5 D	**1.** Ensure the Stockyard Transfer Arm movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If there is no obstruction: **a.** Power **OFF** Stockyard Unit, wait one minute and then Power **ON** the Stockyard Unit to reset. **b.** Place Stockyard in **AUTO** mode to initialize. **4.** If the problem persists, call your Beckman Coulter Representative.
4-08	SM08	Failure to move the Stockyard Transfer Arm on the third level in the Y-axis direction.	3000 Tube Stockyard Top View	C-4/5	**1.** Ensure the Stockyard Transfer Arm movement is not obstructed. **2.** Press **PAUSE**/**RUN** to clear the error. **3.** If there is no obstruction: **a.** Power **OFF** Stockyard Unit, wait one minute and then Power **ON** the Stockyard Unit to reset. **b.** Place Stockyard in **AUTO** mode to initialize. **4.** If the problem persists, call your Beckman Coulter Representative.
7-07	AS07	Stockyard Internal Transfer Arm gripper on the first level failed to pick up sample.	3000 Tube Stockyard Top View	D-4/5 D	**1.** Ensure the sample tube is properly positioned in gripper fingers. **2.** Press **PAUSE**/**RUN** to clear the error.

Table 8.1 Stockyard Unit Error Recovery Codes *(Continued)*

Keypad Display	Sensor[a]	Problem	Sensor Diagram	Grid Ref	Solution
7-22	AS22	Stockyard Internal Transfer Arm gripper on the second level failed to pick up sample.	3000 Tube Stockyard Top View	D-4/5 D	**1.** Ensure the sample tube is properly positioned in gripper fingers. **2.** Press **PAUSE**/**RUN** to clear the error.
7-31	AS31	Stockyard Internal Transfer Arm gripper on the third level failed to pick up sample.	3000 Tube Stockyard Top View	D-4/5 D	**1.** Ensure the sample tube is properly positioned in gripper fingers. **2.** Press **PAUSE**/**RUN** to clear the error.

a. See Abbreviations for a list of sensor codes.

CHAPTER 9

Stockyard Unit Conveyor

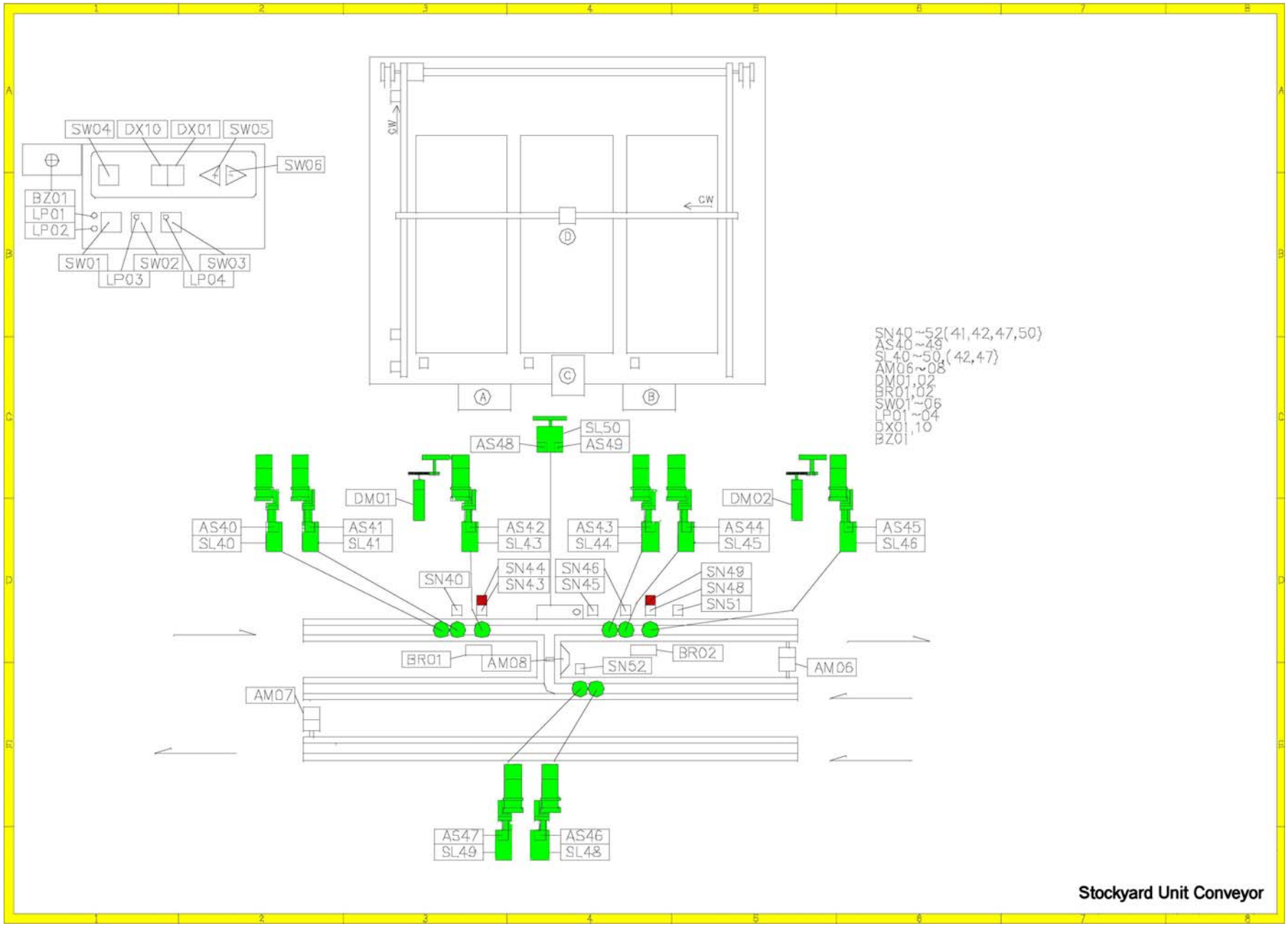
Stockyard Unit Conveyor Pictures

Figure 9.1 Stockyard Unit Overall Rear View

Figure 9.2 Stockyard Unit Conveyor Top View

Figure 9.3 Connection Unit Top Diagram

Stockyard Unit Conveyor



Sensor Codes

The sensor codes provide definitions of the alpha portion of the codes found in the **Sensor** column of the Error Code tables and Sensor diagrams.

1. AM = AC synchronous motor
2. AS = Magnetic autoswitch
3. BR = Bar-code reader
4. BZ = Audible alarm
5. DM = DC motor
6. LP = Lamp (keypad & warning light)
7. LS = Mechanical limit switch
8. PM = Pulse motor
9. SL = Pneumatic solenoid
10. SM = Stepper motor
11. SN = Sensor
12. SW = Keypad switch

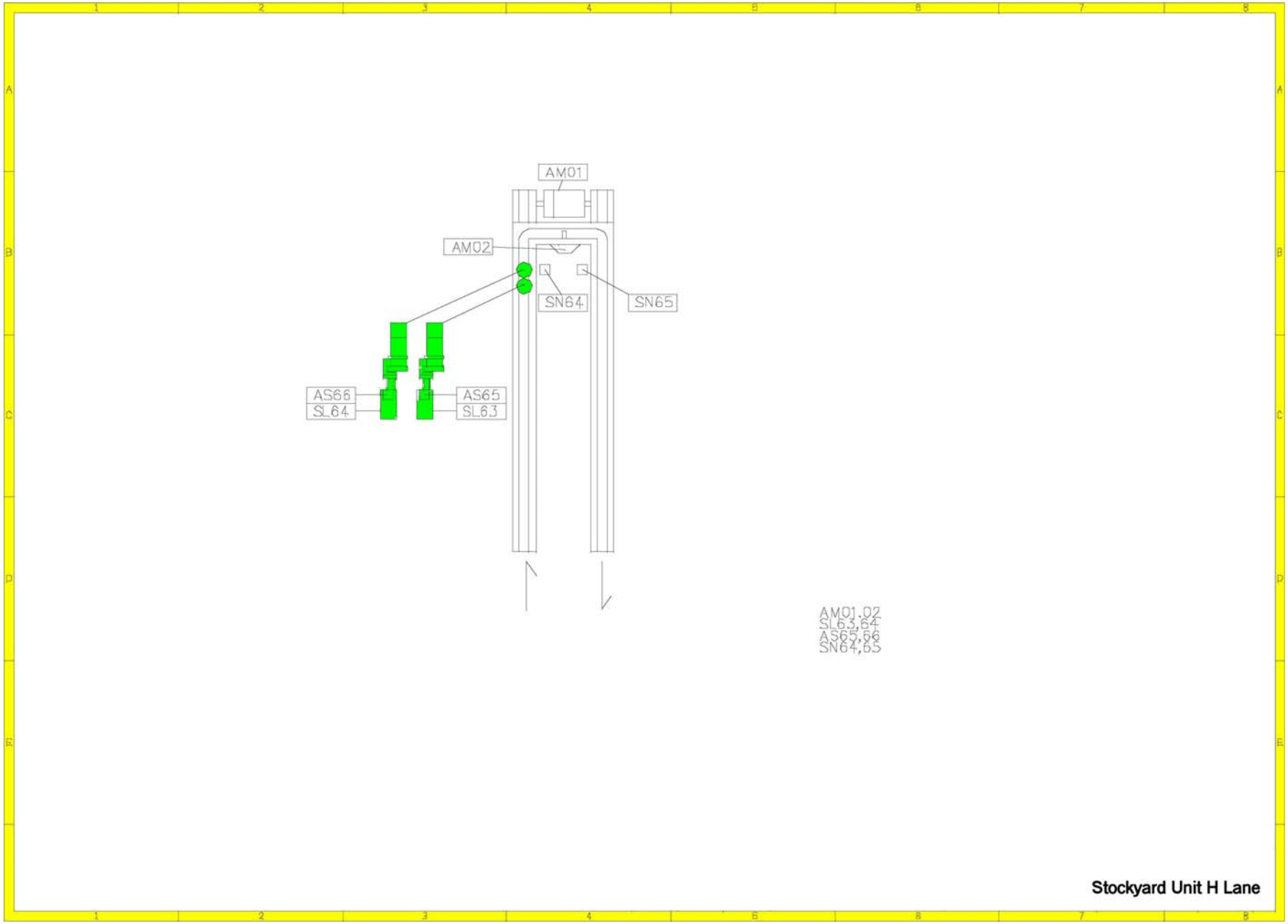
Stockyard Unit H Lane (Pictures)

Figure 9.4 Stockyard Unit H Lane Side View

Figure 9.5 Stockyard Unit H Lane Top View

Figure 9.6 Stockyard Unit H Lane

Stockyard Unit H Lane



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12. SW = Keypad switch

Stockyard Unit T Lane (Pictures)

Figure 9.7 Stockyard Unit T Lane Side View

Figure 9.8 Stockyard Unit T Lane Top View

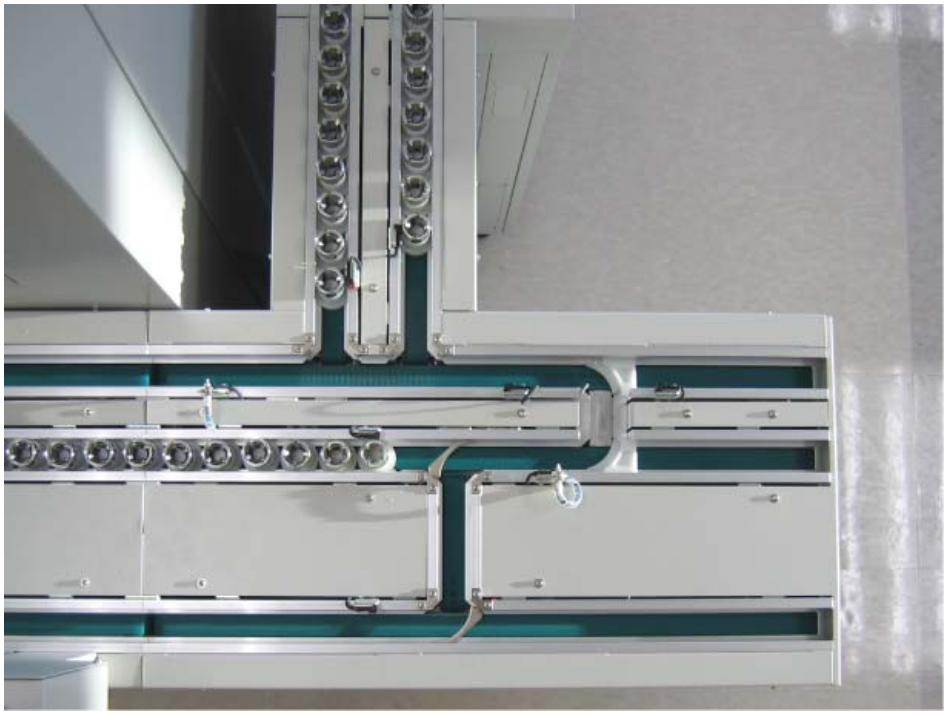
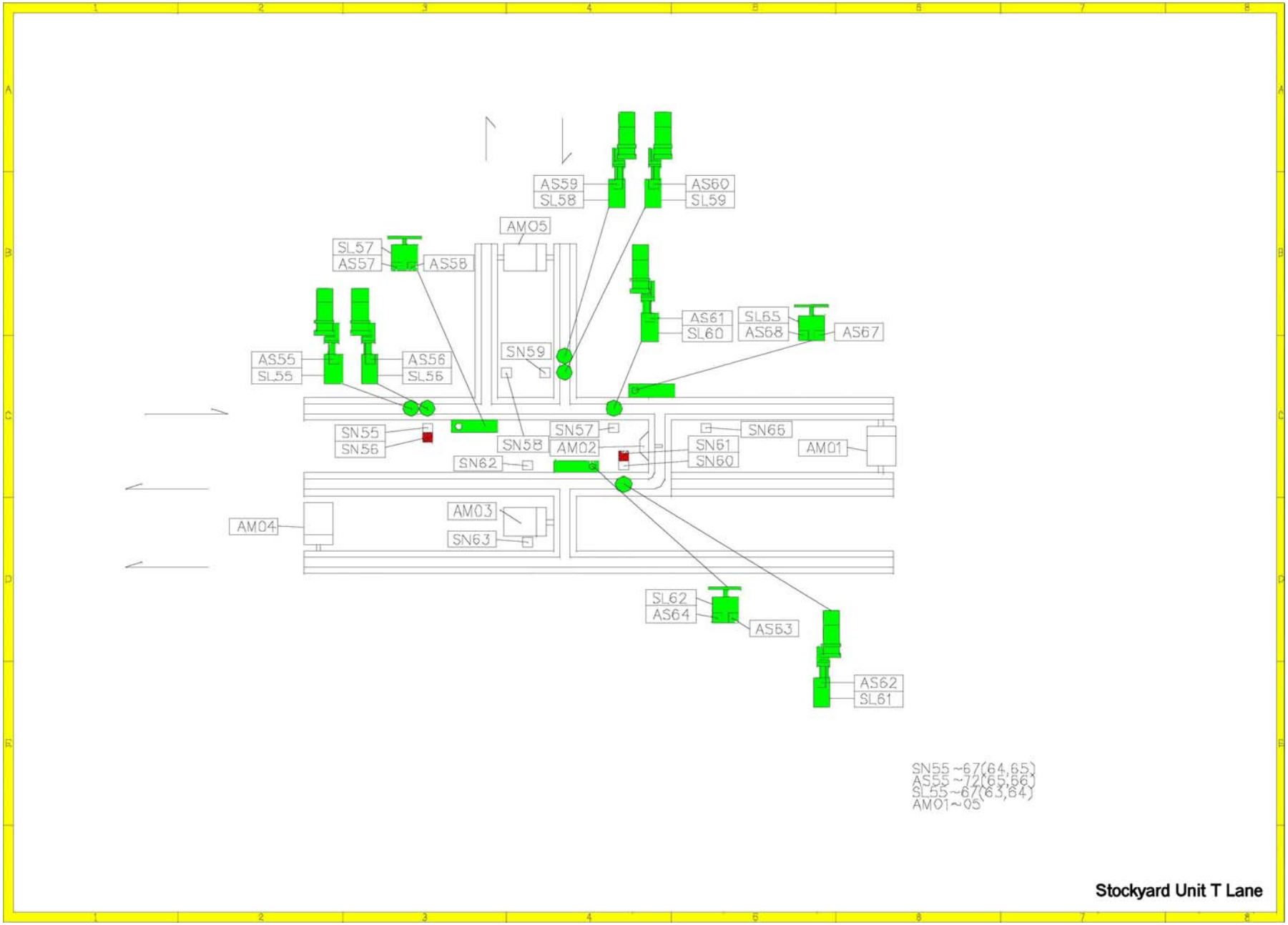


Figure 9.9 Stockyard Unit T Lane

LH 1500 HEMATOLOGY AUTOMATION SYSTEM

Stockyard Unit T Lane



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3000 Tube Stockyard Top View (Pictures)

Figure 9.10 Stockyard Unit Overall Rear View

Figure 9.11 Sotckyard Unit Top View Loading and Retrieivng Arms, Loading and Retrieiving Shuttle Cups and Transfer Arms

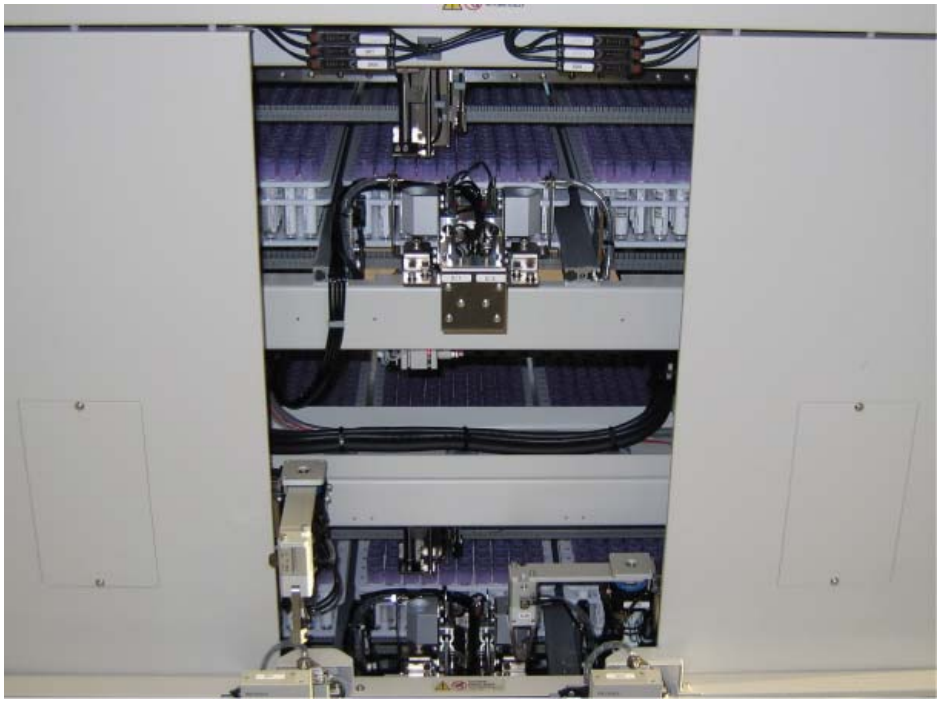
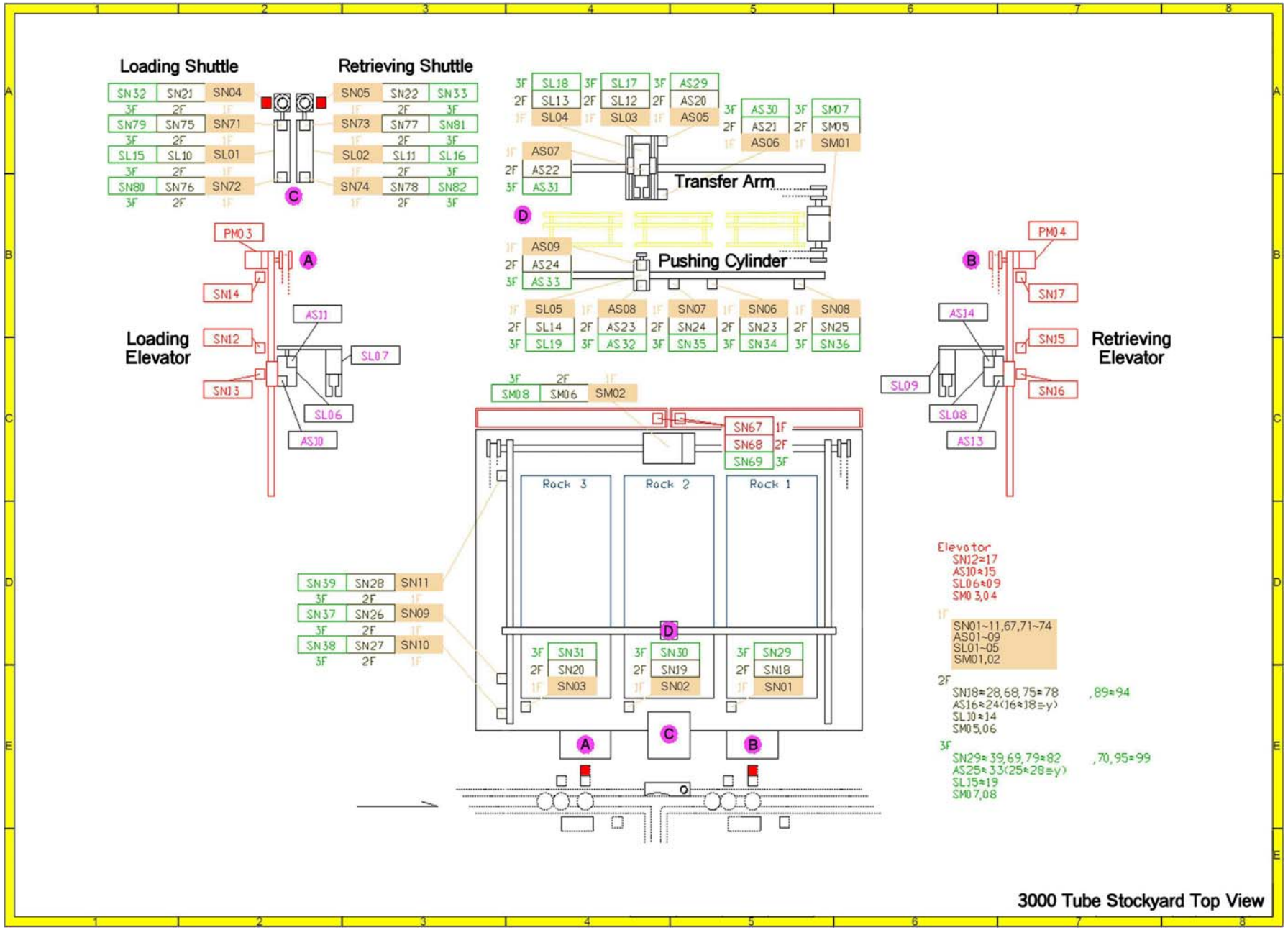


Figure 9.12 Stockyard Unit T Lane

LH 1500 HEMATOLOGY AUTOMATION SYSTEM

3000 Tube Stockyard Top View



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10. SM = Stepper motor
11. SN = Sensor
12. SW = Keypad switch

300 mm Sorting Lane (Pictures)

Figure 9.13 300 mm Sorting Lane Side View

Figure 9.14 300 mm Sorting Lane Top View

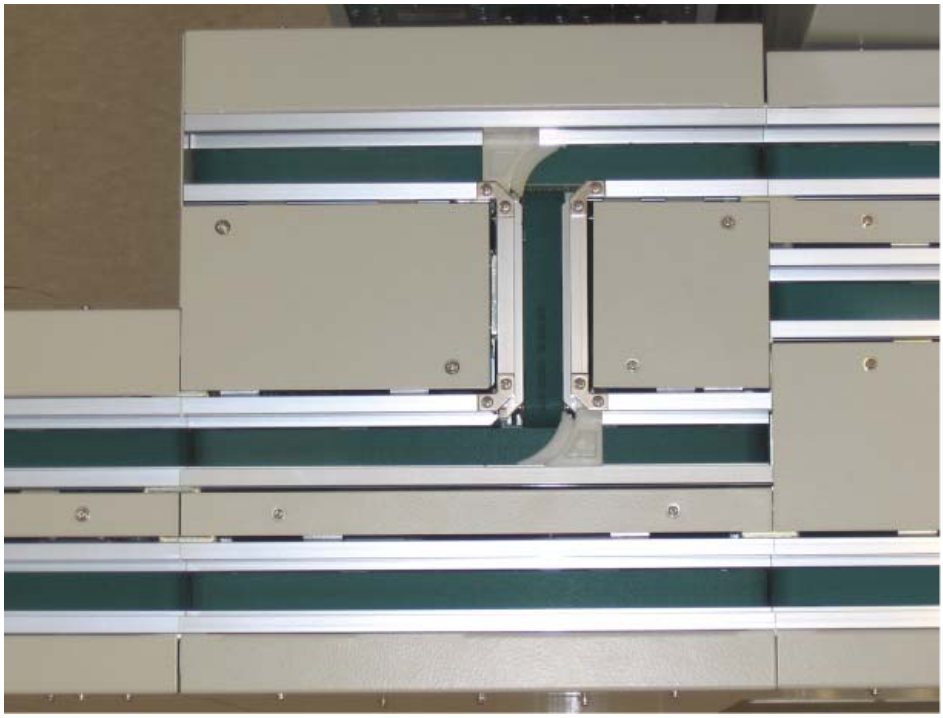
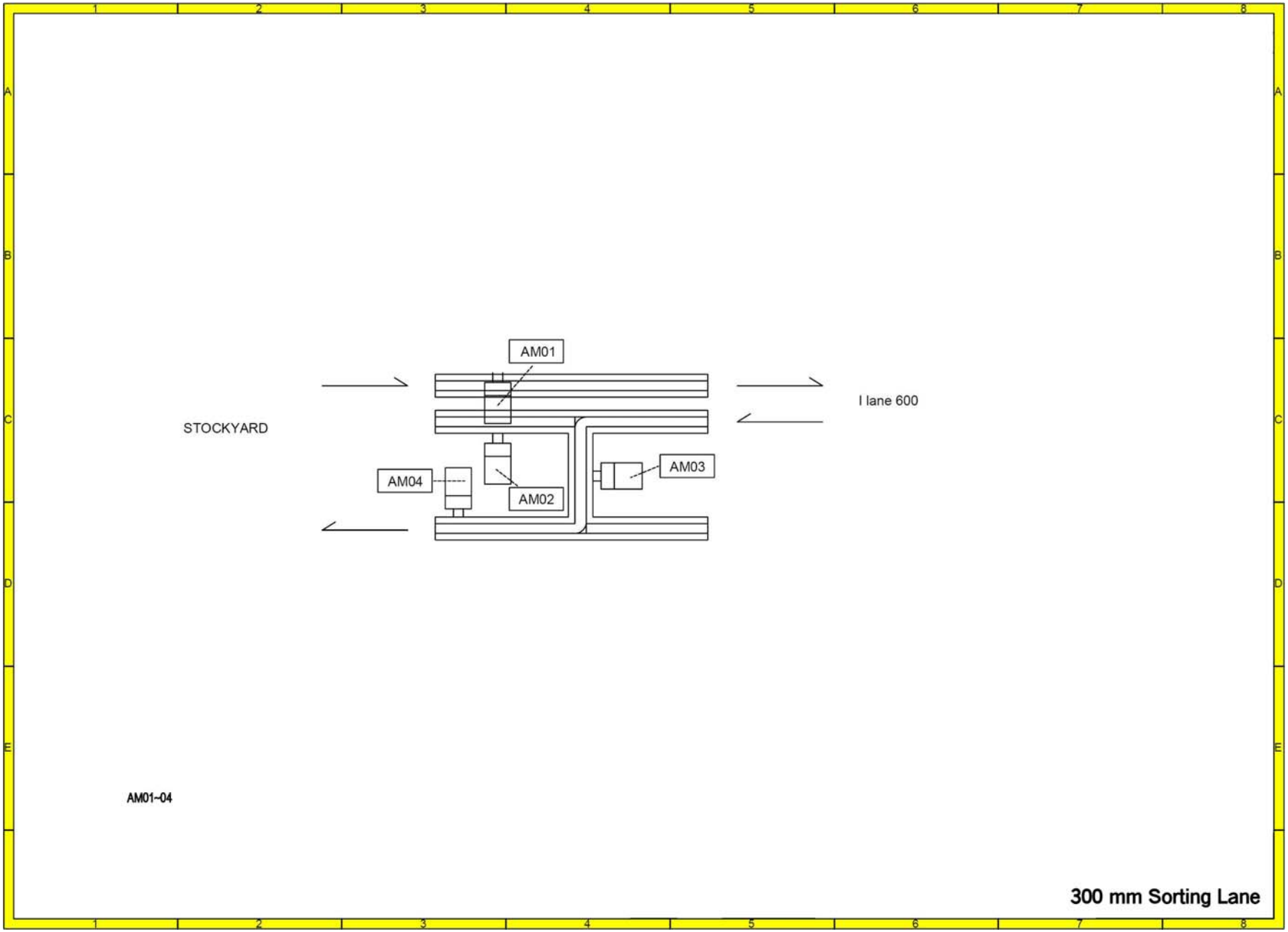


Figure 9.15 300 mm Sorting Lane

LH 1500 HEMATOLOGY AUTOMATION SYSTEM

300 mm Sorting Lane



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11. SN = Sensor
12. SW = Keypad switch

600 mm I Lane (Pictures)

Figure 9.16 600 mm I Lane Side View

Figure 9.17 600 mm I Lane Top View

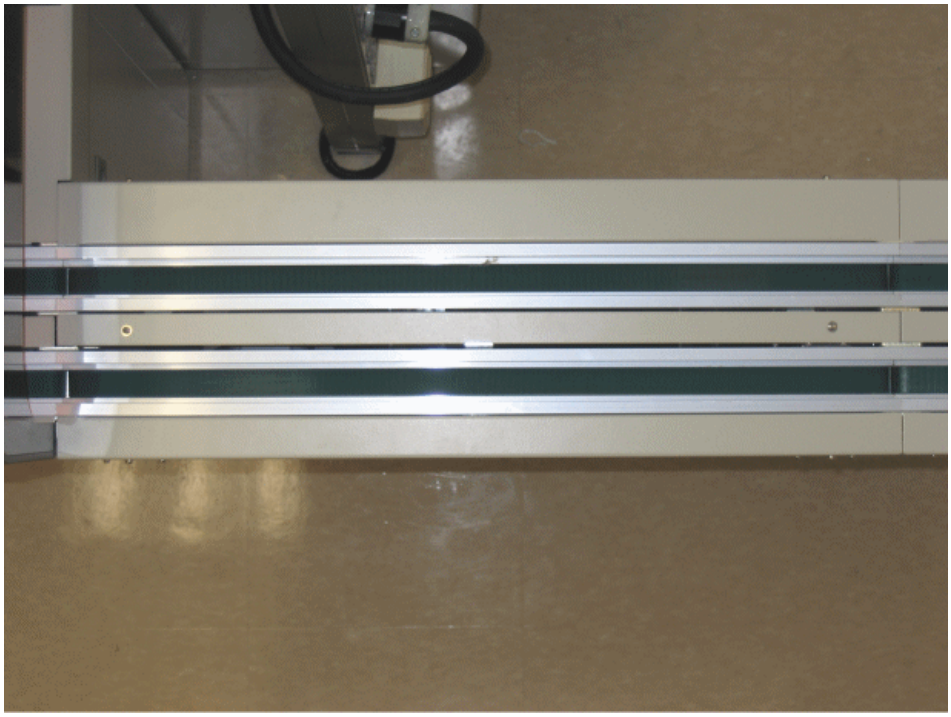
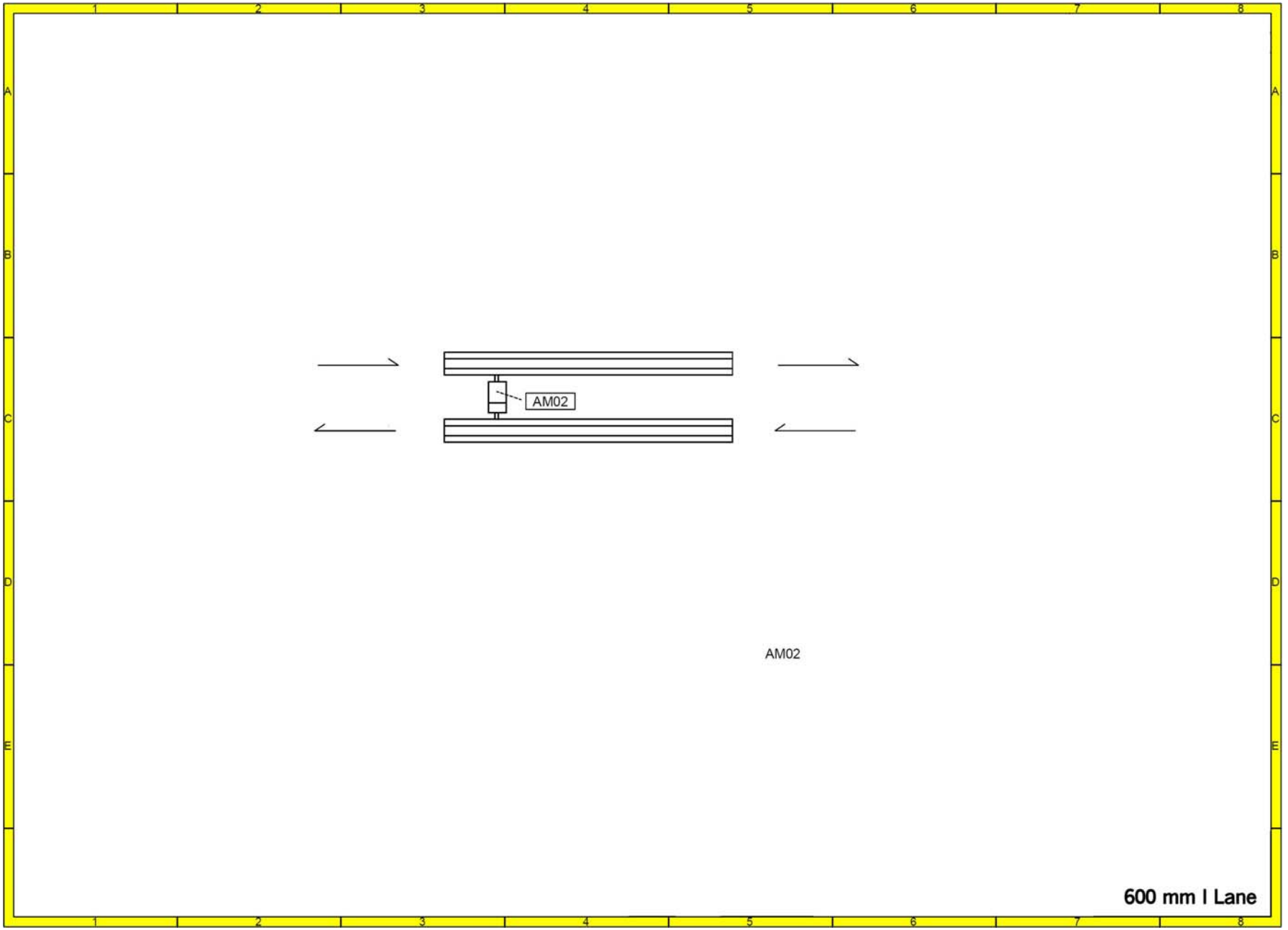


Figure 9.18 600 mm I Lane

LH 1500 HEMATOLOGY AUTOMATION SYSTEM

600 mm I Lane



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8. PM = Pulse motor
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10. SM = Stepper motor
11. SN = Sensor
12. SW = Keypad switch

900 mm I Lane (Pictures)

Figure 9.19 900 mm I Lane Side View

Figure 9.20 900 mm I Lane Top View

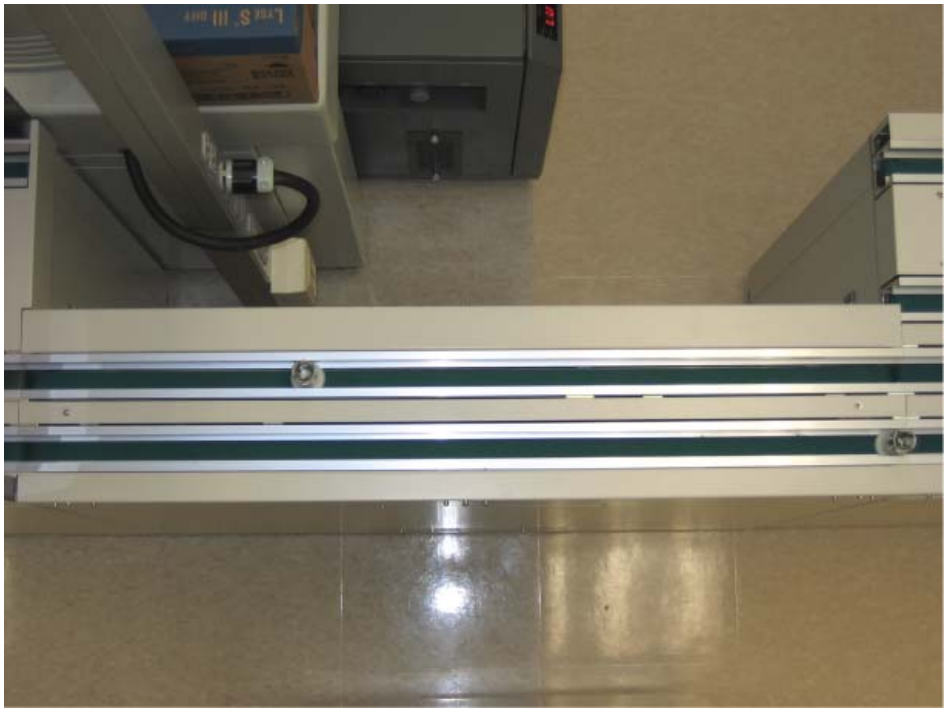
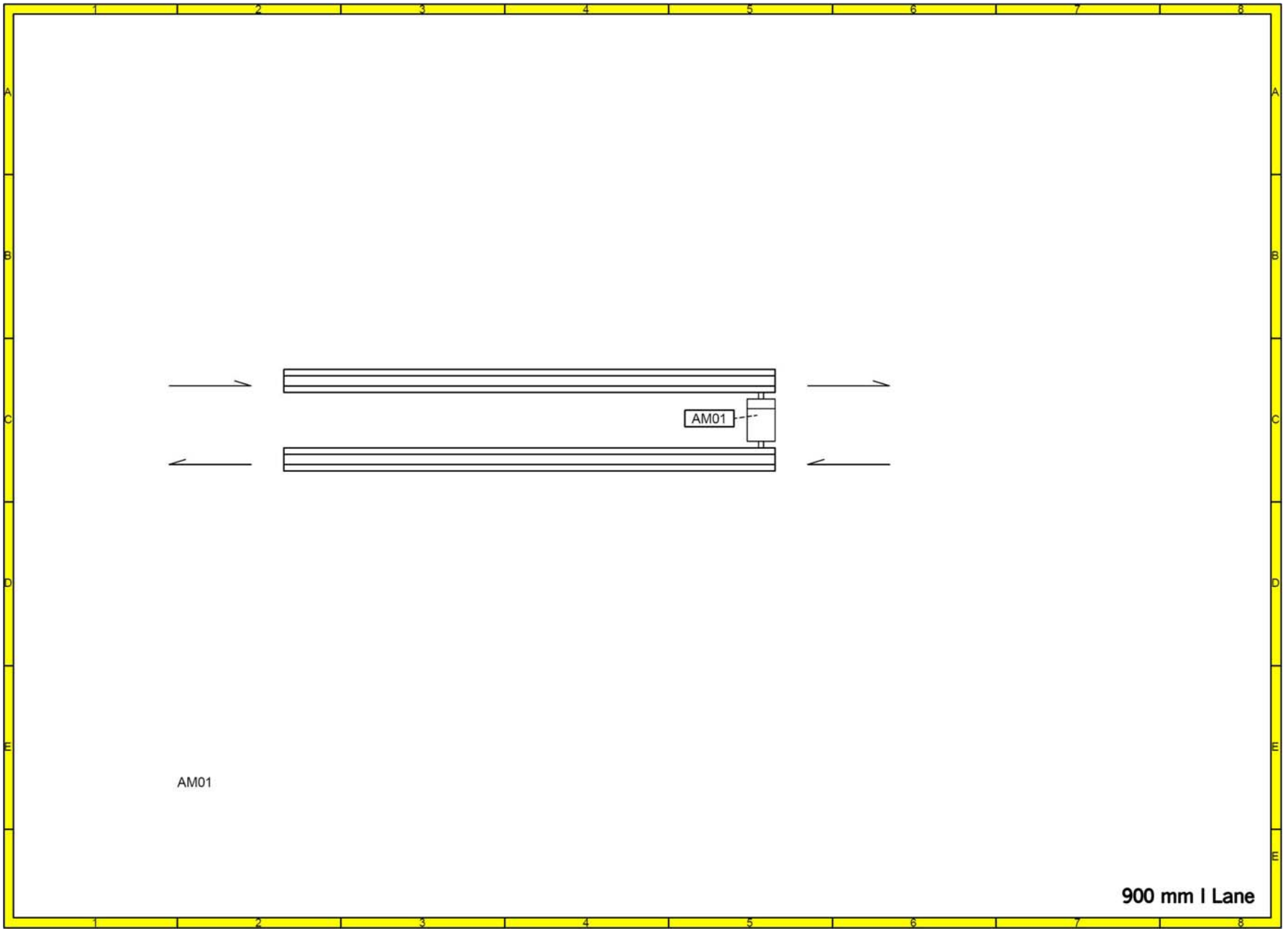


Figure 9.21 900 mm I Lane

LH 1500 HEMATOLOGY AUTOMATION SYSTEM

900 mm I Lane



Sensor Codes

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Abbreviations

AM — AC synchronous motor

AS — Magnetic autoswitch

BR — Bar-code reader

BZ — Audible Alarm

DM — DC Motor

LP — Lamp (keypad & warning light)

LS — Mechanical limit switch

PM — Pulse motor

SL — Pneumatic solenoid

SM — Stepper motor

SN — Sensor

SW — Keypad switch

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